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ARMED SERVICES VOCATIONAL APTITUDE BATTERY: EQUATING AND IMPLEMENTATION OF FORMS 11, 12, AND 13 IN THE 1980 YOUTH POPULATION METRIC

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This paper has been reviewed and is approved for publication.

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EQUATING AND IMPLEMENTATION OF
FORMS 11, 12, AND 13 IN THE
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SUMMARY

This paper describes the equating of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 11, 12, and 13 to the reference test, ASVAB Version 8a. This paper deals with: (a) the equating study design, (b) the methods used in equating, (c) the results of the equating, and (d) the resolution of issues surrounding the speeded subtests of the ASVAB.

The equating study was planned as a two-phased, equivalent groups design using applicants for the armed services at Military Entrance Processing Stations (MEPS) and service recruits at Recruit Training Centers (RTCs). 63,000 applicants took partial batteries of one of the six parallel forms of the newly developed candidate ASVABs (version lla) and like-named subtests from ASVAB 8a and approximately 14,000 recruits took one of seven complete batteries at RTCs. Equatings were separately accomplished for linear, equipercentile, and smoothed equipercentile equating methods in both RTC and MEPS samples. Comparison of the various equating methods was accomplished using several deviation indices computed on raw scores for weighted and unweighted samples. Results of the comparisons revealed that one version of the candidate forms (version 12a) was deviant from the other five versions and a separate conversion table, based on a linear equating of that version in the RTCs, would be satisfactory for operational use.

Conversion tables based on linear equating of ASVAB version 11a in the MEPS appeared satisfactory for the remaining five versions. Comparison between the linear equating method and the other methods revealed very small differences; hence the linear equatings method was chosen for both the RTC and MEPS because fewer parameters needed to be estimated.

Issues surrounding differences in performance between subjects in the 1980 youth population and military applicants on the two speeded subtests (Numerical Operations and Coding Speed) of the ASVAB were described and resolution of the issues proposed. Adjustments to the proposed conversion tables were accomplished using linear equating for the Coding Speed subtest and smoothed equipercentile equating for the Numerical Operations subtest. Evaluation of the speeded subtest issue indicated that the differential performance of the normative population could be satisfactorily accounted for by differences between the answer sheets used in the standardization study and the operational answer sheets. Adjustments to the 1980 score scale using linear and smoothed equipercentile equating satisfactorily accounted for all differences in performance between applicants and the 1980 youth sample. Finally, operational conversion tables were proposed and included in this paper. Based on the results of the equating study and the resolution of the speeded subtest issues, it is recommended that the ASVAB Forms 11, 12, and 13 be implemented, using the 1980 youth population metric, and that an Initial Operational Test and Evaluation of the conversion tables be accomplished.

PREFACE

This technical paper describes the equating of the newly developed Armed Services Vocational Aptitude Battery (ASVAB) Forms 11/12/13 to ASVAB version 8a. The equating of the new versions of ASVAB was accomplished to transfer normative information based on the 1980 youth population scores on ASVAB 8a. Developmental information contained in this paper came from the Ominibus Item Pool and Test Development Project (Contract F-33615-81-C-002U), completed by Assessment Systems Corporation, St Paul, MN, for the Air Force Human Resources Laboratory (AFHRL)

Appreciation is expressed to Dr William Alley of AFHRL and to members of the Defense Advisory Committee on Military Personnel Testing for their suggestions and contributions to this project.

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EQUATING AND IMPLEMENTATION OF ARMED SERVICES VOCATIONAL APTITUDE BATTERY: FORMS 11, 12, AND 13 IN THE 1980 YOUTH POPULATION METRIC

I. INTRODUCTION

This paper describes the equating of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 11/12/13 to ASVAB version 8a (established as the reference test). The equating was accomplished in order to transfer normative information, based on the 1980 Youth Population scores on ASVAB version 8a, to ASVAB Forms 11/12/13. This paper further addresses issues surrounding the 1980 Youth Population scores on the speeded subtests and the resolution of those issues.

The paper gives a brief background description of the ASVAB, which applies to the current Forms 8/9/10 as well as to the new Forms 11/12/13. Only brief mention is made of the actual development of Forms 11/12/13. The main subject of this paper is the equating of the new forms. The body of the paper is divided into four parts: (a) the equating design, (b) the actual equating, (c) the results of the equating, and (d) the resolution of issues surrounding the speeded subtests of the ASVAB. A detailed exposition of the development of the new forms is available in Prestwood, Vale, Massey, and Welsh (1985).

II. BACKGROUND

The ASVAB is the selection and classification test used for enlistment qualification and job placement in the Army, Navy, Air Force, Marine Corps. and Coast Guard. The research and development (R&D) in support of the ASVAB is performed by the Air Force as the executive agent for ASVAB R&D in the Department of Defense (DOD). The Air Force Human Resources Laboratory is the lead personnel research laboratory for ASVAB R&D and, with the cooperation of other service laboratories, was the principal agency responsible for the development and equatings of the new ASVAB Forms 11/12/13. The operational administration of the test battery is performed by the Military Entrance Processing Command (MEPCOM) under the executive direction of the Department of the Army.

The ASVAB

The ASVAB is a multiple aptitude battery currently consisting of 10 subtests that measure verbal, mathematical, technical, and speeded performance in a testing session of approximately 3 hours. Eight of the subtests are power subtests; two are speeded. Table 1 provides the name, abbreviation, length, and power/speed classification of the subtests.

Table 1. ASVAB Subtests

Name	Number of Items	Power/Speea
General Science (GS)	25	Power
Arithmetic Reasoning (AR)	30	Power
Word Knowledge (WK)	35	Power
Paragraph Comprehension (PC)	15	Power
Numerical Operations (NO)	50	Speed
Coding Speed (CS)	84	Speed
Auto & Shop Information (AS)	25	Power
Mathematics Knowledge (MK)	25	Power
Mechanical Comprehension (MC)	25	Power
Electronics Information (EI)	20	Power

Each form of ASVAB has two versions (e.g., Form 11 has versions 11a and 11b). The two versions of a given form have four subtests (AR, WK, PC, and NO) in which there are no common items between versions and six subtests (GS, CS, AS, MK, MC, and EI) which are identical between versions except for slight differences in item order. The four unique subtests are often referred to as the head of an ASVAB and the six common subtests are called the tail. Each form thus has two versions that have unique heads but a common tail. Every 3 or 4 years, another set of three forms (six versions) of the ASVAB is developed and implemented. This periodic replacement is accomplished in order to minimize the effects of test exposure, to replace test items that may become obsolete, and to take advantage of advances in psychological measurement.

Composites

ASVAB subtest scores are combined into composites for selection and classification purposes. The general selection composite, the Armed Forces Qualification Test (AFQT), is used by all the services and the DOD headquarters to report on one aspect of the quality of enlisted accessions. The AFQT is also the measure used by Congress to track the mental qualification of the enlistees in the various services. AFQT scores are created by summing the raw scores of AR, WK, PC, and half-weighted NU and by converting this sum of raw scores to a normative percentile score (see Appendix A). The percentile is currently referenced to a World War II mobilization population.

Apart from the general selection composite used primarily for reporting purposes, a second kind of composite is used by the services for selection and classification. The individual services have their own unique career fields and require a special mix of aptitudes in their recruits. For this reason, selection and classification is accomplished using service-specific composites.

For a number of years, the individual services have each chosen to base their composite scores on sums of standardized subtest scores (SSSs). The subtest raw scores are standardized via a linear transformation to a mean of 50 and a standard deviation of 10. In addition, the raw scores of WK and PC are added together to form a composite called Verbal (VE), which is also standardized to a mean of 50 and a standard deviation of 10. In practice VE is treated as an eleventh subtest. These subtest standard scores are restricted to the range of 20 to 80.

Each service chooses its own method for creating operational composite scores from the SSS; usually based on validity information related to success in the services' technical training schools. The Air Force associates the percentile scores, based on a reference population, with each composite SSS. The Army, Marine Corps, and Coast Guard transform the SSSs to composite standard scores with means of 100 and standard deviations of 20 via another linear transformation. The Navy uses the SSSs, as operational scores, without further manipulation. Table 2 gives the current composites for ASVABs 8/9/10. The Marine Corps and Army are changing their composites for ASVABs 11/12/13.

1944 Norms

Current ASVABs (Forms 8/9/10) and past ASVABs have been normed to a reference base of approximately 1,000,000 World War II men in uniform, tested in December 1944. This reference group is called the 1944 mobilization population or the WWII mobilization population. The reference tests used to generate the 1944 norms were the Army General Classification Test, Form 1c, and the Navy General Classification Test, Form 1 (Stuit, 1947; Uhlaner & Bolanovich, 1952). The score metric based on the 1944 mobilization population is frequently termed the 1944 metric or the 1944 scale.

Tests are scaled in the 1944 metric by equating or calibrating. Calibration and equating are the same mathematical process—if the two tests are content parallel, of the same difficulty and the same reliability, the process is equating; otherwise the process is called calibrating (see Angoff, 1971 for an elaboration of this distinction). Each new form of the ASVAB has been calibrated to a reference test which has been previously calibrated in the 1944 metric. The 1944 metric is then passed on to scores on the new test. ASVAB Forms 8/9/10 service composites and the AFQT were calibrated to the 1944 metric with a 1960s selection test, Armed Forces Qualification Test, Form 7a. Details of this calibration and its evaluation are found in Ree, Mathews, Mullins, and Massey (1982).

Norms and Equating

ASVAB norms are thus dependent on two separate procedures: the equating to a reference test, and the (usually long since accomplished) norming of the reference test. It is not feasible to develop a new reference scale for each new set of ASVABs because the operational selection and classification procedures are metric dependent and would have to be unique to each new set of ASVABs. However, when operational scores in 1984 depend on a chain of

Table 2. Composites Equated for ASVAB 11/12/13

Service	Composite	Definition	
All	AFQT	WK+PC+AR+1/2NU	
	VE	WK+PC	
Army	ARGT	VE+AR	
•	ARGM	MK+EI+AS+GS	
	AREL	AR+MK+EI+GS	
	ARCL	NO+CS+VE	
	ARMM	NO+AS+MC+EI	
	ARSC	NO+CS+AS+VE	
	ARCO	CS+AR+MC+AS	
	ARFA	AR+CS+MC+MK	
	AROF	NO+AS+MC+VE	
	AR ST	VE+MC+MK+GS	
Navy	NEL	AR+MK+EI+GS	
•	NE	AR+GS+2MK	
	NCL	NO+CS+VE	
	NGT	VE+AR	
	NM	VE+MC+AS	
	NEG	MK+AS	
	NAM	VE+MC	
	NC T	VE+AR+NO+CS	
	NNF	MK+EI+GS	
	NHM	VE +MK+GS	
	NST	VE+AR+MC	
	NTM	AR+MC	
Air Force	AFM	MC+GS+2AS	
	AFA	NO+CS+VE	
	AFG	VE+AR	
	AFE	AR+MK+EI+GS	
Marine Corps	MCMM	AR+EI+MC+AS	
,.a. , ,,c	MCCL	VE+MK+CS	
	MCGT	VE+AR+MC	
	MCEL	AR+MK+EI+GS	
	MCGM	GS+AS+MK+EI	
	MCCO	NO+AS+VE	
	MCFA	AR+AS+VE	

equatings of tests back to 1944, it is reasonable to assume a given operational test score earned in 1984 may not indicate exactly the same aptitude as that score indicated in 1944. This scale drift is highly undesirable.

1980 Norms

In addition to the possibility of scale drift over time, other factors weigh against the continued use of the 1944 norms. The norms are male norms, and the services have been enlisting large numbers of women. Also, knowing the mental ability of a service's accessions relative to 1944 military men does not allow service personnel managers to know how the services are doing relative to the current market of potential enlistees in the 1980s—an important concern in this volunteer (nondraft) era.

In order to provide current norms, the DOD and the services, in cooperation with the Department of Labor, sponsored the Profile of American Youth study. This study used the testing of a weighted probability sample of American youth on which to establish current national norms for the ASVAB. The National Opinion Research Center (NORC) of the University of Chicago, under contract with the DOD, tested about 12,000 youths on ASVAB Form 8a, from July through October 1980 (Office of the Assistant Secretary of Defense, 1982). This sample was weighted to represent American youths, ages 16-23 years of age. A subset of this sample, 18-through 23-year-old males and females, formed the new reference population for the ASVAB and is referred to as the 1980 Youth Population.

Subtests of the ASVAB 8a were standardized in the Youth Population. Composite sums of standard scores were transformed to a 1980 score scale. Comparisons have been made between the 1944 score scale and the new 1980 score scale (see Maier & Sims, 1982; Ree, Valentine, & Earles, 1985). The construction of a 1980 Youth Population norm permits scores for future ASVABs to be stated in the 1980 metric. This can be done by equating new test scores to ASVAB version 8a. Thus, ASVAB Forms 11/12/13 were equated to version 8a in order to permit the reporting of ASVAB Forms 11/12/13 scores in the 1980 metric. An Initial Operational Test and Evaluation (IOT&E) is planned to check the accuracy of these equatings. An IOT&E involves the recomputation of conversion tables and comparisons of these tables with the operational tables used at implementation. Data are collected on all new versions and the reference test at all the Military Entrance Processing Stations (MEPS) during the first 3 months of operation. The first IOT&E of ASVAB was conducted shortly after the implementation of ASVAB 8/9/10 in October 1980, and the second IOT&E was tentatively scheduled for October 1983 after the planned implementation of ASVAB 11/12/13 in the 1980 metric.

Speeded Subtest Issue

Shortly after the decision was made to implement ASVAB Forms 11/12/13 in the 1980 metric, some anomalies were noted by Sims and Maier (1983) on speeded subtest performance between the 1980 youth population and military applicants/recruits. The 1980 youths performed relatively more poorly on the speeded subtests when compared to military applicants/recruits.

Review of the Youth Aptitude Profile Study (McWilliams, 1980) revealed that the 1980 youth sample responded to ASVAB & on answer sheets that were different from operational answer sheets used by military applicants. An experimental study on Air Force recruits by Earles, Wegner, Ree, and Valentine (1983) identified the type of answer sheets used in the Youth Aptitude Profile study as the probable source of the anomaly. A subsequent investigation of the answer sheet differences using military applicants (Wegner & Ree, 1985), replicated the early findings and provided a conversion table to adjust for the effects of the "slower" (non-operational) answer sheet.

Subsequent sections of this paper will cover in detail the equating of ASVAB 11/12/13 and the subsequent adjustments to the 1980 score scale to account for the differential performance of the normative group on the speeded subtests of the ASVAB.

III. PART I. EQUATING STUDY DESIGN AND OPERATIONAL PLAN

Six new versions of the ASVAB were developed through an iterative process that successively culled candidate test items using three samples of examinees of increasingly broader ability range. The first round of item culling was accomplished using a sample of Air Force recruits, while the second sample used recruits from all the services' training centers. Finally, candidate ASVABs were administered to a large sample of applicants at the MEPS. Each successive sample was more expensive in terms of time, disruption, and cost. This process yielded six new candidate versions of the ASVAB, and these contained six unique AFQTs and three unique classification portions of the battery (six heads and three tails). The development of the items and candidate forms is described in detail elsewhere (Prestwood, Vale, Massey, & Welsh, 1985). These six candidate versions were designated lla, llb, 12a, 12b, 13a, and 13b and were equated to ASVAB 8a using data collected between January and March of 1983. The equating study design and the plan to implement that design were generated by the Joint Services Selection and Classification Working Group and approved by the Defense Advisory Committee on Military Personnel Testing (DAC) in August 1982.

Study Design and Rationale

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The design of the equating study for ASVAB Forms 11/12/13 equated the new tests to a reference test (ASVAB 8a) that was parallel in content to the candidate batteries. ASVAB Forms 11/12/13 were constructed to be parallel in content, difficulty, and reliability to the reference test (ASVAB 8a) by the method of stratified parallel forms described elsewhere (Ree, Mathews, Mullins, & Massey, 1982). Because the new batteries were content parallel, an equating, as opposed to a calibration, was conducted.

If there were no constraints, an optimal equating study would have new ASVAB forms and the reference test (ASVAB 8a) administered under conditions that closely mimic the operational testing environment. The complete battery of a new version and of the reference test would be administered to a single group of randomly selected applicants for military service. However, adding the testing time required for one additional battery at the

MEPS would cause a large number of applicants to be held over an additional day with room and board costs. It would also be costly in terms of overtime hours required for Office of Personnel Management (OPM) test administrators, and regulations limit the number of overtime hours permitted such testers. There are also fatigue and motivational concerns. Therefore, the MEPS management strongly urged the minimum testing time per applicant consistent with technically sound practice.

Consequently, an alternative design was developed to equate ASVAB Forms 11, 12, and 13 to ASVAB version 8a. This design was the most defensible, given the operational realities of time, cost, and administrative control at the MEPS. The alternative design also minimized MEPS disruption and examinee burden.

All six versions of the candidate ASVABs were constructed to be parallel; therefore, equating any one version should be tantamount to equating all versions. This permitted a two-phase equating design. One candidate version was selected for equating in the MEPS, and all six candidate versions were administered in Recruit Training Centers (RTCs). In both the MEPS and RTC samples, the reference battery, version 8a, was also administered. The RTC full-battery administration of version 8a would allow the development of equating tables for any candidate version should it be found not quite parallel. An equivalent groups design (Angoff, 1971) was used to minimize additional testing time by allowing each examinee to take only one test version (a candidate ASVAB or the reference ASVAB).

In order to further minimize additional testing time in the MEPS, partial, as opposed to full, batteries were administered. Nine partial batteries were constructed from subtests from the most central version of the candidate ASVABs and nine from the like-named subtests from ASVAB 8a. The most central of the candidate ASVAB versions was determined by selecting the set of experimental subtests having the lowest root mean square deviation (RMS) between the estimated true-score distributions of the subtests and the average of the experimental subtests (Prestwood, Vale, Massey, & Welsh, 1985). Composition of these partial batteries was determined such that all unique combinations of ASVAB subtests representing service aptitude composites and the AFQT were contained within at least one of the booklets. Table 3 gives the composition of the nine partial batteries.

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 22. Version lla was designated the "most central" and combinations of ASVAB lla subtests were administered in the nine separate booklets at 64 MEPS. Numbers of testing booklets provided each MEPS are indicated in the MEPCOM Operational Plan (OPLAN) in Appendix B of this paper. Each MEPS testing location received an equal number of each of the 18 test booklets. These booklets were to be administered before production testing. Booklets containing either subtests from ASVAB lla or the ASVAB 8a were alternately distributed to applicants to assure equivalent samples. The plan called for approximately 63,000 applicants, or about 3,500 examinees per booklet.

Complete batteries of all six new versions and the ASVAB &a were administered in 11 RTC locations to investigate parallelism-both among the new tests and with the ASVAB &a. This design also allowed equating tables for all versions to be developed from the full battery administrations. An equivalent groups design, in which examinees were assigned to take one of the seven complete batteries, was also employed in the RTC testing. This insured equivalency of the groups. The RTC sample requirements were estimated at 14,000 total recruits, or about 2,000 examinees per booklet.

Table 3. Subtests Included in Experimental Booklets Administered in the MEPS

					Subt	est				
Form	GS	AR	WK	PC	NO	CS	AS	MK	MC	ΕI
1	Х	Х	-			·-		Х	-	Х
2	X		X	Х	Х		Х		Х	
3	Х		Х	Х				X	X	
4	X						X	Х	X	Х
5		Х	Χ	Х	χ	χ	Х			
6		Х	Χ	X	X	Х				
7		Χ			Χ		χ		Х	X
8		X				Х	X		X	X
9		X				X	,,	Х	X	•

It is believed that the above plan represented the best compromise between the operational realities and the technical requirements of the equating. Both linear and equipercentile equatings were planned. The next section deals with the actual equating study.

IV. PART II. CONDUCT AND RESULTS OF EQUATING STUDY

The equating design for ASVAB Forms 11/12/13 was accomplished as planned during the first 3 months of 1983 in RTCs and MEPS.

Data Editing

A series of operations to check the quality of the data were performed prior to actual analyses and equatings. The data editing was accomplished in order to assure that the test booklets and forms were properly identified and that the data were appropriate for equating. The first step in the editing process verified the form number recorded by the examinee and corrected miscoded form numbers. In the second step, item response information was edited using likelihood ratios to eliminate suspect cases. The editing operations were the same for both MEPS and RTC data. Cases in the samples were rejected if (a) too few items were answered in any subtest, (b) improbable response strings or patterns were observed, and (c) the recorded answers matched other keys substantially better than that of the coded form number, or (d) the scores on some of the subtests

deviated substantially from predicted scores based on the regression of all other subtests (in order to detect nonstandard administrations). A detailed description of the data editing procedures is presented in Prestwood, Vale, Massey, and Welsh (1985).

Military Entrance Processing Stations Data

Secretary secondary

A total of 78,182 tests were administered to applicants for the military services in the MEPS. For the MEPS sample, nine experimental partial batteries and nine similarily composed booklets with ASVAB & subtests were administered. Table 4 provides a summary of the MEPS results of the editing procedures. About 98% of the MEPS sample (76,545) was usable.

Table 4. Results of Data Editing in the MEPS

Number	Percent of Total
76,545	97.91
376	.48
416	.53
179	.23
107	.14
559	.71
78,182	100.00
	76,545 376 416 179 107 559

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 24.

Recruit Training Center Data

A total of 14,791 recruits were tested in the RTCs. Experimental and reference test booklets were assigned three—digit form numbers that used modular arithmetic so that each three—digit form number was a triply redundant index of the test version. Thus, the first digit of each form number was the same as the assigned index number; the second number was the index number plus four, modulo ten; and the third number was the index number plus ten, modulo ten. This was done in order to recover as much examinee-miscoded information as possible. Table 5 gives the form numbers assigned for RTC testing. Results of the editing of RTC data are shown in Table 6. About 97% of the 14,791 recruits tested in the RTCs provided usable data for the equating.

Table 5. Form Numbers Assigned to Booklets Used in the RTCs

Version	Form Number
lla	RTC 158
116	RTC 269
12a	RTC 370
12b	RTC 481
13a	RTC 592
13b	RTC 603
8a	RTC 714

Table 6. Results of Data Editing in the RTCs

Category	Number	Percent of Total
Good Cases	14,325	96.85
Form-number problems	360	2.43
Too few responses	62	.42
Key mismatches	10	.07
Patterned responses	17	.11
Deviant scores	17	.11
Total	14,791	99 . 99a

aTotal percentage does not equal 100.00 due to rounding.

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 20.

Demographics

Demographic data collected in the MEPS and RTCs were examined in order to detect any anomalous variation that might cast doubt on the equivalency of the groups. Table 7 shows the demographic characteristics of examinees tested in the MEPS. Each of the 18 test forms was administered to approximately 4,000 examinees. The demographic characteristics of this sample appeared representative of the applicants at the MEPS. Table 8 shows the demographic characteristics of the examinee samples in the RTCs. Most of the approximately 2,000 examinees taking each form had at least a high school diploma consistent with known characteristics of armed services accessions. The data in Table 8 indicate only minor sampling fluctuation between groups for each of the seven complete batteries administered in the RTCs.

Table 7. Demographic Summary for MEPS Samples (In Percentages)

				Con	figura	tion			
Characterístic	1	2	3	4	5	6	7	8	9
	Experimenta	ıl Sut	tests	(ASVAB	Form	11a)			
Sex									
Male	84	84	83	82	83	83	84	84	83
Female	15	16	16	17	17	16	16	16	17
Omit/Miscoded	01	01	U1	01	01	01	01	01	0.
Population Group									
American Indian	01	01	01	01	01	01	00	01	Ú.
Spanish American		06	05	05	05	05	04	06	04
Asian	00	01	01	01	01	01	01	01	Ü
Black	23	22	23	25	23	26	25	23	27
White	6 8	68	69	66	69	66	67	67	66
	01	01	01	01	01	01	01	01	0.
Other									
Omit/Miscoded	02	01	01	01	01	01	00	01	0.
Testing Site		0.5				4.4		•	6.1
MEPS	20	21	22	25	25	25	23	30	3!
MET	27	26	22	25	27	24	30	23	27
OPM	52	50	53	49	46	48	45	42	4(
Omit/Miscoded	01	02	03	02	02	03	03	06	03
Number of Subjects	4431	4520	4304	4278	4127	4286	4265	4496	4510
	Refere	nce Si	ubtest	s (ASVA	NB 8a)				
Sex									
Male	84	83	83	82	83	84	84	84	84
Female	15	16	17	17	17	16	15	16	16
	01	01	00	01	00	01	01	00	
Omit/Miscoded	UI	01	UU	UI	UU	UI	UI	00	01
Population Group								0.9	
American Indian	01	01	01	01	01	01	01	01	01
Spanish Americar	ո 05	06	04	05	05	04	04	06	04
Asian	01	01	01	01	01	01	01	02	01
Black	23	23	23	25	21	24	23	24	27
White		68	69	65	71	6 8	bŷ	66	65
Other	01	01	01	01	U1	01	01	01	01
ULITET	01	01	01	01	01	01	01	01	01
Omit/Miscoded	UI								
Omit/Miscoded	O1								
Omit/Miscoded Testing Site		22	22	24	23	22	22	28	34
Omit/Miscoded Testing Site MEPS	19	22 27	22	24 26	23 27	22 25	22 30	28 24	34 23
Omit/Miscoded Testing Site MEPS MET	19 28	27	22	26	27	25	30	24	23
Omit/Miscoded Testing Site MEPS MET OPM	19 28 52	27 51	22 53	26 49	27 48	25 50	30 45	24 42	23 40
Omit/Miscoded Festing Site MEPS MET	19 28 52	27	22	26	27	25	30	24	23

Note. Due to rounding, percentages may not add to 100.

Table 8. Demographic Summary for RTC Samples (In Percentages)

			RTC	Form Nu	mber		
Characteristic	158	269	370	481	592	603	714
Sex							
Male	83	83	83	83	83	83	83
Female	17	17	17	17	17	17	17
Omit/Miscoded	00	00	00	00	00	OΟ	00
Population Group							
American Indian	01	01	01	01	01	01	01
Spanish American	04	05	04	04	04	05	05
Asi an	01	01	01	01	01	U1	01
Black	18	18	18	17	18	18	17
White	74	73	74	75	75	73	75
Other	02	01	01	01	01	02	02
Omit/Miscoded	01	01	00	U1	υl	UÜ	00
Education Level							
8 or less	00	00	00	00	00	UU	ÚÚ
9	02	02	01	02	02	02	01
10	03	03	04	03	03	03	04
11	03	03	03	03	03	03	03
12	14	14	13	13	14	13	14
GED	06	05	0 6	04	05	05	05
HS	34	34	36	34	34	34	35
13+	15	15	16	15	14	16	16
Omit/Miscoded	23	24	22	25	24	24	22
Testing Site Air Force							
Lackland AFB	16	16	16	16	15	15	15
Army	10	10	10	10	.5	13	13
Ft. Bliss	03	03	03	03	03	03	03
Ft. Dix	06	07	07	07	07	07	07
Ft. Jackson	18	17	17	17	17	18	17
Ft. Knox	08	07	08	Ü7	80	08	08
Ft. Leonard Wood	06	06	06	07	06	07	U 7
Ft. McClellan	03	03	03	03	03	03	03
Ft. Sill	03	03	03	03	03	03	03
Marine	•	•					
Paris Island	07	07	06	υ7	07	U 7	07
San Diego	06	06	06	07	06	06	06
Navy					-		
Great Lakes	09	08	09	09	U9	08	09
Orlando	07	07	07	07	07	07	07
San Diego	07	07	07	07	υ7	07	u7
Omit/Miscoded	02	02	οi	ΰì	02	02	02
Number of Subjects	2055	2064	2040	2056	2050	2033	2027

Note. Due to rounding, percentages may not add to 100.

As a check on the parallelism of the new ASVABs, summary score statistics were computed for each subtest given in the MEPS and in the RTCs. The mean, standard deviation, skewness, kurtosis, median, minimum, and maximum values were computed. For the power tests administered in the RTCs, the reliabilities (KR-20) and standard errors of measurement were also computed. The specific results of these analyses are detailed in Prestwood, Vale, Massey, and Welsh (1985). The overall conclusion, based on the descriptive statistics, was that five of the candidate forms were statistically parallel and one was not. The implications of this development are dealt with in the next part of this paper, on equatings of each of the experimental versions to the reference test.

V. PART III. EQUATING AND TABLE DEVELOPMENT

Both linear and equipercentile equatings were accomplished. Linear equating of tests is done by setting raw scores with common standard scores or z-scores, on the two tests, equal. Thus, a raw score on one test is equivalent to the raw score on the other test that shares a common z-score (Angoff, 1971, pp. 568-573). A necessary condition for linear equating is that the distributions of both tests are similar in shape.

Equipercentile equating is done by setting raw scores on two tests equal if they have the same percentile rank in the samples on which equating is done (Angoff, 1971, pp. 568-573).

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Linear equating, by the nature of the transformation, always produces a smooth equating line, but the equipercentile procedure occasionally produces a jagged equating curve. Therefore, equipercentile equating transformations are usually smoothed. Smoothing of equipercentile equating in this study was accomplished by using cubic polynomial regression (Ree et al., 1985). In this procedure, the candidate test score was treated as the independent variable and the reference test score was treated as the dependent variable. The first, second, and third powers of the independent variable (i.e., the candidate test score) were entered as independent variables into a multiple regression equation and were fit to the old test scores. it is possible that the cubic regression can produce an undesirable non-monotonic equating curve, monotonicity was forced in the resulting equating table. This was done by starting near the middle of each equating curve and, going up toward higher scores, refusing to allow the score level to fall. Similarly, when going down from the middle toward lower scores, the score level was not allowed to rise.

A final problem encountered in equipercentile equating is the difficulty in developing an equating curve at the tails of the score distribution if no or few cases are observed. For example, if no scores are observed below a raw score of 5 on a given test, it is impossible, using the definitional form of the equipercentile procedure, to equate scores below 5. In this effort, scores beyond the distribution of available data were equated in the following manner: The upper and lower scores that could be equated using the equipercentile procedures were determined, as were scores one third of the range down from the top score and one third of the range up from the bottom score. Linear extrapolations to the tails of the distributions were made using these scores.

These procedures were used to equate 10 raw-score subtests, two raw-score composites (AFQT and VE), and 14 unique standard-score composites from Table 2 for all six candidate versions. The raw-score composites were simple sums of other raw scores. Thus, for the purpose of equating, the two raw-score composites (AFQT and VE) were computed directly from the raw subtest scores prior to equating and were then equated in the same manner as any other raw test score. Table 9 shows the transformations used to compute standard scores from raw scores for each subtest. Means and standard deviations in these transformation values were determined in the weighted 1980 Youth Population sample. The standard-score composites were computed from subtest standard scores in a manner described below. These composites of standard scores were then equated. Table 2 shows the composition of the composites that were equated in this study.

Table 9. Standardizing Transformations

Subtest	Transformation*		
General Science Arithmetic Reasoning Word Knowledge Paragraph Comprehension Numerical Operations Coding Speed Auto-Shop Information Mathematics Knowledge Mechanical Comprehension Electronics Information Verbal Composite (VE)	[(10/5.010) (Score - 15.950)] + 50 [(10/7.373) (Score - 18.009)] + 50 [(10/7.710) (Score - 26.270)] + 50 [(10/3.355) (Score - 11.011)] + 50 [(10/10.985) (Score - 34.498)] + 50 [(10/16.247) (Score - 46.254)] + 50 [(10/5.550) (Score - 14.317)] + 50 [(10/6.393) (Score - 13.578)] + 50 [(10/5.349) (Score - 14.165)] + 50 [(10/4.236) (Score - 11.569)] + 50 [(10/10.595) (Score - 37.281)] + 50		

*Values of these transformations are based on the 1980 Youth Population, ages 18-23.

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 56.

Equating Data

The 10 subtest scores and 2 raw-score composites were equated in the MEPS and in the RTCs using linear and smoothed equipercentile procedures. One linear and one smoothed equipercentile table was developed for each of the 12 scores on each of the six candidate tests for the RTC data and for the one ASVAB version used in the MEPS. In addition to each of these individual tables, an average table was developed by taking the mean of the entries in each of the six tables from the RTC data.

Standard-score subtest equating tables were developed by applying the standardizing transformations shown in Table 9 to the raw-score equating entries in each of the seven tables. Standard scores were computed only for the 10 subtest scores and the Verbal Composite (VE). No standard scores were computed for the AFQT composite because it uses a raw-score-to-percentile conversion.

Final equating tables for the subtest raw scores were developed by rounding the standardized scores to the nearest integer number. This rounding was done after the standardized scores had been converted from raw scores.

MEPS Tables

The most central experimental version (ASVAB 11a) was equated to the reference test (ASVAB 8a) in the MEPS using nine different booklets for the most central version and nine for the reference battery. Each booklet contained subtests necessary to compute at least one service-specific composite.

To accomplish the raw-score equatings, data from all of the experimental or ASVAB 8a versions administered in the MEPS were pooled so that all examinees who took a given subtest were included. Using these pooled samples, linear and smoothed equipercentile equating tables were developed for the 10 subtest scores and the two raw-score composites. Two sets of composite scores (linear and smoothed equipercentile) were then computed for each military composite using the appropriate standard-score equating table and the pooled sample of all examinees available for that composite.

RTC Tables

Individual version and average tables were constructed for composite scores, using both linear and smoothed equipercentile procedures for subtest and composite scores. The composite scores were calculated by applying the like-named subtest standardized equating tables to the raw subtest scores. For example, to construct the linear, individual-form, composite equating tables for RTC 158 (ASVAB 11a), the composite scores were computed by summing the standardized equated scores based on the final linear equating table for the RTC 158 subtests. To construct the average equipercentile composite equating tables, the composite scores were computed by summing the standardized equated scores based on the final average equipercentile equating tables for the subtests across all versions. Thus, for each one of the composites, 14 equating tables were developed using the RTC data. Six individual tables and one average table were developed using the linear procedure, and six individual and one average table were developed using the equipercentile procedure.

Graphic Representation of Equatings

Appendix C contains the graphic representations of the equatings compared in this study. These graphs show the raw equipercentile, smoothed equipercentile, and linear equatings of raw scores of version lla to the like-named reference subtests in ASVAB 8a for MEPS data. The same equatings are shown for RTC 370 (ASVAB 12a) based on the RTC data. Caution should be exercised when examining the graphs of the equatings. In particular, the scale for the various subtests change as a function of the length of the subtest, but the length of the axes do not. This constraint is due to page size and is a problem in all graphic interpretations. In short, differences in the equating methods may appear to be accentuated for short subtests.

Larger differences among the three types of equating lines occur at the low end of the scale. Where the data become sparse, a vertical line has been drawn on the equating graphs. Raw frequency tables are provided in Appendix D.

Table Evaluation

Procedure. While several different types of equating methods were compared in this study, only one method of equating could be chosen for any given test version. Thus, the various equatings had to be evaluated to determine which ones were to be accepted. Three questions had to be answered before a decision could be rendered:

- 1. How many tables should be necessary for the six candidate versions?
- 2. If a single table were to be used, should it be the average RTC table or should it be the ASVAB lla (MEPS) table?
 - 3. Should a linear or smoothed equipercentile table be used?

No absolute data were available directly addressing these questions because there are no criteria upon which to evaluate the accuracy of empirical equatings. In the absence of desired criteria, relative information was used. Thus, instead of determining the absolute accuracy of the tables, the differences among the tables were considered; if two different types of tables produced essentially equivalent results, the administratively more convenient of the two would be the table of choice. In order to address the above questions, a series of table comparisons were undertaken.

Equating tables were compared using three deviation measures computed on raw scores, both weighted and unweighted. Bias was computed as the average of the differences between corresponding entries in two equating tables. The absolute average deviation (AAD) was computed as the average of the absolute differences between corresponding entries in the two tables. RMS was computed as the square root of the average of the squared differences between corresponding entries in the two tables. These three deviation measures were computed first by equally weighting all of the entries in the tables and were computed again by weighting the entries by the score frequencies of the examinees.

First, the six individual tables computed using the RTC data were compared to the average of these tables. This comparison was done to determine if an average table could be substituted for the six individual tables, thus providing part of the information necessary to address the first question. The score frequencies for each of the individual tables were used in computing the weighted deviation measures.

Second, the ASVAB 8a tables were compared to the average RTC tables. These comparisons demonstrated how different the new tests were from the reference battery in order to further examine the efficacy of using a single conversion table. The total sample of RTC examinees was used to provide weights for the weighted deviation measures.

Third, the ASVAB Form 11a MEPS tables were compared to the 11a RTC tables, the average RTC tables, and the ASVAB 8a tables. These comparisons were done to determine how the MEPS table differed from the RTC tables for candidate and reference tests and to provide information as to which tables to use--MEPS or RTC. The MEPS sample provided the frequencies for the weighted statistics in all three of these comparisons.

Finally, deviation measures for linear and equipercentile equatings were compared to address the question as to which type of equating would best serve the needs of the testing system.

Results. Table A-1 (Appendix A) shows the deviations for subtests and raw-score composites resulting from linear equating. The first six sets show the deviations of the tables for the individual versions from the average RTC table. The average bias for the subtests and raw-score composites was smallest for the deviations between RTC 158 (ASVAB 11a), the version identified as most central on the basis of pretest information, and the average RIC table. The AAD and RMS were, however, smallest when the RTC 603 (ASVAB 13b) table was compared to the average table. The weighted AAD and weighted RMS statistics were also smallest for RTC 603. The weighted bias was smallest for RTC 481 (ASVAB 11b). When the new versions were compared to the average table, these deviations were uniformly highest for RTC 370 (ASVAB 12a). The largest deviations for the AFQT scores were found when the RTC 370 (ASVAB 12a) table was compared to the average RTC table. The absolute value of bias, for instance, was 55 percent higher than the next higher value for an individual AFQT table compared to the average AFQT table.

Table A-2 (Appendix A) shows the deviation measures for the subtests and raw-score composites resulting from smoothed equipercentile equating. When the average deviations were compared for tables based on the six individual versions and the average RTC table, the average deviations for the RTC 370 (ASVAB 12a) were generally largest. The unweighted deviation measures for the individual AFQT tables, when compared to the average AFQT tables, were higher for equipercentile equating than for linear equating. The weighted deviation measures for the AFQT composite were remarkably similar for both the linear and equipercentile table comparisons. The average weighted deviation measures comparing the ASVAB 8a table and the average RTC table were about the same as for the linear equating, but the unweighted statistics were slightly higher for the linear tables. The unweighted deviation measures for the AFQT composite were smaller for the comparison of the MEPS table with the average RTC table than for the comparison of the MEPS (ASVAB 11a) table with the same version (ASVAB 11a) administered in the RTCs. Just the opposite was true for the weighted deviation measures.

Table A-3 (Appendix A) shows the deviation measures for the standard-score composites resulting from the linear equating procedure. As might be expected, because the subtests were equated prior to forming the composites, the average bias indices were lower than for the individual subtests. The average deviations between the tables based on the individual versions and the average RTC table were more uniform across the versions than were the average deviations of the subtests.

Table A-4 (Appendix A) shows the deviation measures for the smoothed equipercentile equating tables for the standard-score composites. The average deviations were generally higher than those observed for the linear equating tables. The average bias between the RTC 370 (ASVAB 12a) table and the average RTC table was much higher than the same figure for the linear equating tables. The difference was due primarily to the large biases for three composites--ARSC, AROF, and MCCO. These large biases do not show up in the analyses of the linear tables.

Summary. The Joint Services Selection and Classification Working Group (JSSCWG) met in April of 1983 to consider the results of the equatings. Based on the results of the comparison just described, version 12a was considered to be less parallel than were the other forms. This is evident from the deviation measures for linear equating in Table 10. The difference was particularly large for the AFQT composite. The JSSCWG determined that the optimal tables for operational use with Form 12a were the tables developed based on the RTC 370 data.

Table 10. Speeded Subtest Comparisons

		Answer Sheet Group						
Test	NORC		Operational					
	Mean	SD	Mean	SD	F Katio ^a			
Numerical Operations Coding Speed	32.639 45.594	8.748 12.211	35.829 46.930	8.889 12.582	281.17* 24.95*			
couring speed	73.334	14.411	TU. 330	12.502	24.33			

aDegrees of freedom are 1 and 8596. Type 1 error rate was set at .01. Fratios significant at this level are indicated by an asterisk.

The JSSCWG concluded that linear equating tables would be used. Comparisons between the linear and smoothed equipercentile comparisons showed little difference between the two methods (Figures C-1 through C-24 in Appendix C). The linear tables were chosen because they were less likely to have been spuriously affected by sample-specific error. The graphs presented in Figures C-25 through C-36 (Appendix C) show the trivial differences among the subtest equatings in the RTCs and the MEPS. Versions lla, llb, l2b, l3a, and l3b were sufficiently parallel for the same equating table to be used for all five versions in operational testing. Tables chosen for this purpose were the tables constructed from the experimental subtests administered in the MEPS based on ASVAB lla. These tables were chosen, rather than average RTC tables, because they were based on a large, unrestricted sample of examinees in the population of interest.

The JSSCWG concluded that the new forms of the ASVAB (Forms 11/12/13) could be implemented (with the tables discussed above) on 1 October 1983. Approximately 1 month later, the Center for Naval Analysis published a report documenting relatively large and consistent mean differences between the performance of the subjects in the 1980 Youth Population and military

applicants/recruits on the two speeded subtests of the ASVAB: Coding Speed and Numerical Operations (Sims & Maier, 1983). The next part of this paper deals with the nature and resolution of the issue raised by Sims and Maier concerning the speeded subtests.

VI. PART IV. ISSUES SURROUNDING THE SPEEDED SUBTESTS

The Issue

Sims and Maie: (1983) compared the test performance of males in the 18through 23-year-old segment of the American youth sample to the results obtained from several samples of male military applicants and recruits at different aptitude levels. These comparisons revealed that the males of the 1980 Youth Population and a sample of male military applicants differed only trivially on the eight power subtests of ASVAB 8a. There were notable differences, however, in both the Numerical Operations (NO) and Coding Speed (CS) subtests (both speeded tests). The differences were such that, at each aptitude level, scores for those in the 1980 Youth Population were consistently lower than scores for those tested in military testing environments. The differences, after controlling for aptitude, were estimated at about three raw-score points on NO and one-raw score point on CS. Sims and Maier (1983) concluded that if the 1980 Youth Population were used as the reference for the new ASVABs, with the proposed tables, the speeded subtest scores of persons tested under military conditions would be inflated. The projected amount of inflation ranged from about 4 percentile points for the AFQT (which contains half-weighted NO), to about 13 percentile points on the Air Force Administrative composite.

Definition of Issue

After Sims and Maier (1983) published their paper, a preliminary review of the testing procedures used in both the Youth Aptitude Profile study and the military testing environment led to three plausible hypotheses for the differences found in the speeded subtest performance of the two groups. The first hypothesis was that the differences found in the subtests reflected inherent aptitude differences between civilian samples and military samples. The second hypothesis, developed after careful consideration of the test materials used in the Youth Aptitude Profile study, was that the answer sheets used in the Profile study varied enough from the operational ASVAB answer sheets (DOD 1304.12-C) to account for the differences in speeded subtest performance. Finally, it was hypothesized that other administrative differences in the Youth Aptitude Profile study versus military testing environments (e.g., time of day tested, subject motivation) were the sources of differential subtest performance.

Investigation (Earles et al., 1983) revealed that variations in the type of answer sheets used by the two groups could account for almost all of the differences in speeded subtest performance observed by Sims and Maier (1983). Earles et al. (1983) based this conclusion on the results of a pilot study of approximately 500 Air Force recruits conducted during the summer of 1983. The results of the pilot study further suggested that adjustments could be made to the normative tables to equalize the effects associated with the use of nonoperational answer sheets in the Youth Aptitude Profile study. Because this pilot study was conducted on a small

and highly restricted sample, a more comprehensive study was undertaken to provide more complete information about the magnitude of the answer sneed differences and to provide more stable estimates of any adjustments to the normative data.

Approximately 9,400 applicants for military service were tested in October and November 1983 at 19 geographically dispersed MEPS in order to provide confirmation of the results of the pilot study and to provide stable adjustments to the 1980 reference population data. The details of the study are reported in Wegner and Ree (1985). The following paragraphs present an overview of the procedures used to correct or adjust the 1980 reference scale.

The results of the Wegner and Ree (1985) study indicated that the differences observed by Sims and Maier (1983) between military samples and the 1980 Youth Population were also found between two groups of military applicants who used different answer sheets. Table 10 provides the results of the comparisons of speeded subtests from Wegner and Ree (1985).

Issue Resolution

Because the 'Vegner and Ree (1985) results confirmed the findings from the pilot study, equatings were performed to adjust the normative data. For NO and CS, linear and equipercentile equatings were done to equate scores on the Youth Aptitude Profile answer sheet to scores on the operational answer sheet. Equipercentile equatings included unsmoothed and analytically smoothed (linear, quadratic, and cubic polynomial regression) variations. Constraints were imposed to insure monotonicity and to restrict equated scores to the raw test score range. The first four moments of a distribution (mean, variance, skewness, and kurtosis) were computed for the two answer sheet groups on the NO and CS data, and several deviation indices (BIAS, AAD, and RMS) were computed to compare the equatings.

For NO, difference in the shapes of the distributions of the two answer sheet groups suggested that linear equating was inappropriate (Wegner & Ree, 1985). Deviation indices showed both the quadratic and cubic polynomial smoothings of the equipercentile equatings to be reasonable smoothing methods. The quadratic smoothing, however, involved fewer estimators than cubic smoothing and would be expected to yield more stable values. Thus, the method used for NO was a constrained equipercentile equating with quadratic polynomial smoothing. Comparisons of the two groups on CS revealed that the shapes of the distributions were almost identical. A linear equating was therefore selected, and scores were constrained to keep them within the range of the test.

The specified equatings resulted in real number scores designed to make performance on Youth Aptitude Profile answer sheets comparable with performance on operational answer sheets. These scores were rounded to integers to make them appropriate for operational use. Table 11 shows the raw-score conversions for equating NO and CS scores on Youth Aptitude Profile answer sheets to scores on operational answer sheets.

Table 11. Conversion of NORC Scores to Operational Scores for NO and CS

NORC Raw Score	NOa (n=4,299)	(n = 4,299)	NORC Raw Score	NO ^a (n = 4,299)	(n = 4,299)
U	U	0	42	45	43
]	Õ]	43	46	44
2	1	2	44	47	45
3 4	2 4	3 A	45 46	48 49	46 47
5		1 2 3 4 5 6 7	47	49	48
6	5 6	6	48	50	49
7	8	7	49	50	50
8	9	8 9	50	50	51
9	10		51		53
10	11	10	52		54
11	12	11	53		55
12	14	12	54		56
13	15 16	13	55 5.6		57 60
14 15	16 17	14 15	56 57		58 59
16	18	16	58		6U
17	19	17	59		61
18	21	18	60		62
19	22	20	61		63
20	23	21	62		64
21	24	22	63		65
22	25	23	64		66
23	26	24	65 66	•	67
24	27 28	25 26	66 67		68 69
25 26	26 29	27	68		70
27	30	28	69		71
28	31	29	70		72
29	33	30	71		73
30	34	31	72		74
31	35	32	73		75
32	36	33	74		76
33	37	34 35	75 76		77 78
34	38 39	36	76 77		76 79
35 36	39 39	30 37	77 78		80
37	40	38	79		81
38	41	39	80		82
39	42	40	81		83
40	43	41	82		84
41	44	42	83		84
			84		84

Note. This table was taken from Wegner and Ree (1985), Table 5.

^aAfter adjustment from equating.

In order to determine if adjustments corrected the observed differences, a series of linear model analyses was conducted. Results of these analyses indicated that the adjustments reduced score differences throughout the ability range to insignificant amounts. More detailed presentation of these analyses may be found in Wegner and Ree (1985).

Final ASVAB 8a Normative Tables

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The NO and CS raw subtest scores for the 1980 Youth Population sample were replaced with integer values from the adjusted NO and CS tables. The new means and standard deviations of NO and CS were computed for the reference group—the weighted 1980 Youth Population, ages 18 through 23. The resulting means and standard deviations were adopted for use in converting ASVAB version 8a raw scores on NO and CS to standard scores (Mean = 50, SD = 10) in the 1980 score scale. 1980 norms for all ASVAB 8a composites using NO and CS were recomputed with adjusted raw scores for the AFQT and the adjusted standard scores in the SSSs for service composites.

Final ASVAB 11/12/13 Conversion Tables

A process involving three steps was required to convert Form 11/12/13 raw scores to 1980 service-specific operational scores. First, each ASVAB 8a subtest raw score had an associated standard score computed in the normative population, the 1980 American youth. The subtest raw scores from each of six new versions were equated to three like-named ASVAB 8a raw scores. Second, the subtest raw scores on the new versions (11/12/13) were "assigned" the associated ASVAB 8a standard score that corresponded to the ASVAB 8a raw score. Finally, in order to convert scores in the metric appropriate for each service, the standard scores were summed and given corresponding service-metric-specific values. This last step involved going from the sum of standard scores to the operational metrics of each of the services expressed in the 1980 Youth Population. This process was not necessary for the AFQT scores as they do not use standard scores, but instead convert directly from raw scores to percentile scores.

Finally, in order to create service specific scores, the standard scores were summed and given service-specific operational values in the 1980 Youth Population. This involved going from the sum of standard scores to the operational metrics of each of the services expressed in the 1980 Youth Population (e.g., percentiles for Air Force, and standard scores for Army, Navy, and Marine Corps).

In the first step, linear equatings were used to convert raw scores from the new versions to version 8a raw scores. The five most parallel versions (lla/llb/l2b/l3a/l3b) were linearly equated using data collected from the MEPS sample in which lla was equated to 8a. Version l2a was linearly equated in raw score form to 8a using data collected from the RTC sample in which l2a was equated to 8a. In all of these equatings, operational answer sheets were used. The raw score equatings are therefore totally independent of the speeded subtest issue.

The next two steps were affected by the adjustments to the speeded subtests. The changes in the means and standard deviations of NO and CS in the normative population (based on 8a) that resulted from differences in the answer sheets changed the NO and CS standard scores. Thus, SSS composite scores containing NO and CS changed, as well as the raw score composite values for AFQT (which contains half-weighted NO). The new, adjusted cumulative proportion of 1980 American youth (ages 18-23) scores on ASVAB 8a are provided in Table I-2 (Appendix I).

With composite SSSs and AFQT scores expressed in terms of the scores of ASVAB 8a, the adjustments to the speeded subtests now affected transfer of Forms 11/12/13 scores to 1980 metric values in the same way any 8a scores were affected (see Appendix E, Final 8a Normative Tables and Final Composite Tables). The speeded subtest adjustments therefore affected the norm tables, but not the raw score equatings.

VII. CONCLUSIONS

- 1. The design for equating ASVAB 11/12/13, which was approved by the DAC, was executed without deviation from the planned procedures.
 - 2. Five of the six candidate ASVABs were parallel; ASVAB 12a was not.
 - 3. Linear equating is desirable for Forms 11/12/13.
- 4. MEPS data are appropriate for equating the five parallel forms, and RTC data are appropriate for equating version 12a.
- 5. The normative population scores have been corrected to make them appropriate for use in the DOD testing programs.

Empirical verification of these conclusions is based on an Initial Operational Test and Evaluation (IOT&E) of the conversion tables for Forms 11/12/13 (at Appendixes E, F, and G). The IOT&E takes place in the MEPS approximately 2 weeks after the implementation of the new test.

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APPENDIX A: RAW/COMPOSITE SCORE DEVIATION ANALYSES FOR LINEAR AND EQUIPERCENTILE EQUATING TABLES

TABLE A-1. Raw-Score Deviation Analyses for Linear Equating Tables

				?	<u> </u>	;	2	ź) Ľ	13	ب >	AFQT	Average
1	Ta oc oc	F 88 -	•	hie from Aver	74 464	- 14 - F) 						
	, c	770	,		-0.75		107 0-	8	6			6	ć
	9,00				21.0		607		7.0				2.0
3 3			200	0.00	0000		78.7	707.0	167.0	1.003		0.337	0.330
3	750.0	0.3/	0.223	0.42/	0.730	0.216	667.0	0.318	0.310	1.022		0.447	0.485
Wt-8189	-0.07	-0.103	-0.032	0.185	-0.519	0.110	-0.470	-0.163	-0.284	0.936		-0.355	-0.056
Vt-AVD	0.072	0.270	0.111	0.186	0.539	0.220	0.410	0.212	0.284	0.936.		0.372	0.316
Ft-245	9.00	0.320	0.129	0.256	0.580	0.220	0.471	0.251	0.291	0.945	971.0	0.423	0.412
Seviation of RT	n of RT	C 269 T	C 269 Table fr	OB AVE	on Average RIC	Table							
8 2 3	0.342	0.643	-0.415	0.647	-1.394		-0.141	-0.274	-0.524	454.0	0.010	•	מ ה כ
644	97.0	144.0		C 28.0	761			7,7	; c	777			
2 4	27.0	6,45		, 6	, C , 4	70.0	; ;	, , ,	; c	7 7 7	2 -		0 6 6
:		4.0			77.7				;				7000
	7	***	77.0	7,7	1 / 5 / 1			007.0	ı	20.0		20.00	9
3 2 2									· (0000			61.0
2	0.7.0	•		500		5.1. 0		8/7.0	·	507.0	0.150		0.573
Deviatio	eviation of RT	C 370 T	able fr	om Aver	C 370 Table from Average RIC	Teble							
8 . 8 9	-0.215	0.003	0.134	1.743	1.385		0.891	0.242	0	-0.595	0.551	1.340	905.0
3	0.475	0.087		1.743		0.207		0.382	0		0.551	1.340	0.637
RKS	0.561	0.105		1.809		0.220		0.460	0		0.560	1.366	0.834
4t-31as	0.100	0.048		1.469		0.192	0.797	0.217	0	•	0.606	1.529	0.526
CYY-1.5	0.269	0.073	0.224	1.469	1.484	0.192		0.319	0.335		909.0	1.529	0.562
24-14	0.323	0.038		1.521	1.515	0.197	0.811	0.378	0	0.647	0.607	1.535	0.663
Devise 16	on of RT	1 189 0	table fr	TAVE TO	OR Average RTC	Table							
	786 0-		946	-1 676				3	•				
	, a	2	, ,	474	0.00		2 -			•		•	77.0
									> (0.00		7.0
?	1	717.0	6.5.0	26/1	1/9.0	0.1.0		0.865	•	0.710	0.375		0.731
#1-21 8	-0.052	-0.030	0.022	-1.284	0.647	0.086		0.418	0	•	-0.384	•	6.013
¥:	0.189	171.0	0.124	1.284	0.647	0.086	9.9.0	0.624	0		0.334		0.455
S = 2 = 1 =	0.231	0.158	0.158	1.348	0.655	0.053	0.657	0.733	0	0.632	0.385	0.125	0.538
Deviseic	on of RI	C 592 :	table fr	OB Avet	Deviation of RTC 592 Table from Average RTC	Table							
3100	-0.148	-0.385	0.164	-0.889	-0.303		-0.782	-0.264	-0.450		9.147	-0.854	0.33
ş	0.148	0.536	0.164	0.901	0.314	0.357		0.453	0.450		0.195	0.950	0.448
223	0.153	0.683	0.175	1.079	0.322	0.421	0.785	0.542	0.504	0.428	0.239	1.174	0.627
VI-BIAS	-0.173	-0.194	0.216	679.0-	-0.240	-0.030	177.0-	-0.216	4		0.013	-0 272	5
VE-AAD	0.173	0.173	0.216	0.472	0.271	0.186	0.741.	0.150	× 7		460	ייני הלני	77.0
122	76.0			307	* 1.4	,,,,							

TABLE A-1. (Concluded)

	SS	*	řγ	PC	RO	Scor	Y	¥	Ä	£1	34	AFQT	Average
Deviati	Deviation of RIC 603 Table from Avera Sias 0.361 -0.147 -0.254 -0.335	TC 603 1 -0.147	C 603 Table from Ave -0.147 -0.254 -0.335	rom Aver	ge RTC 0.377		-0.189	0.033	0.306	0.183	. 231	-0.111	0.026
3	0.581		0.254		0.388	0.309	0.220	0.235	007.0	0.195	0.232	0.287	0.309
2	0.69.0	0.329	0.256		0.472	0.319	0.270	0.272	0.495	0.237	0.275	0.137	0.384
	•	70.0	•	•	0.196	-0.327	-0.090	0.024	0.463	0.243	-0.367	-0.352	-0.033
Wt-245	0.386	0.179	0.285	0.510	0.209	0.327	0.129	0.169	0.538	0.243	0.367	0.357	0.256
Deviat 1	Deviation of 8a		from Average	RTC Tab	RIC Table (RIC		frequencies mand for	to Los	(anda) ex	7			
B143	-0.601		1.439 -1.982	-0.529	-0.934		-0.509	-0.318	1.282	-0.238	-1.617	-1.310	0440
3	1.306		2.000	0.760		0.173		0.686		0.548	1.678	1.643	1.102
RYS	1.534				0.955	0.202		0.811	1.403	0.646	2.050	2.007	814.1
Wt-Bias		_	•		-0.869			-0.257	1.162	0.010	-0.672	-0.190	0.00
VC-AAD	0.789	~		0.450	0.882			0.534	1.162	0.332	0.797	0.632	0.710
Vt-275	0.920	1.412	1.270	0.552	0.904	0.138	0.567	0.625	1.226	0.398	1.070	0.793	0.904
Deviati	Deviation of MEPS Experimental Table	EPS Expe	etlaent	al Table	from 8	•							
Bies	0.443	0.443 -1.432	1.993	1.405		0.064	-0.082	0.462	-1.765	1.211	1.893	1.540	244.0
3	1.585				0.610	0.301	0.830	0.845	1.765	1.282	1.954	2.456	192
RYS					0.729	0.353	0.960	1.008	1.803	1.550	2.368	2.955	1.780
Vt-3148	•	•			0.212	0.103	-0.510	177.0	-1.807	0.935	0.973	-0.088	0.026
¥t-140	.10	1.723	_	0.889	0.392	0.175	0.743	0.722	1.807	0.975	8	1.204	1.002
Vr-RYS	1.324	1.793	1.511	1.121	0.493	0.217	0.879	0.832	1.808	1.149	1.437	1.454	1.259
Deviset	Deviation of MZPS Experimental Table from Average	EPS Expe	rioent	al Table	from A	Verage	RTC Table	•					
3149	-0.158	0.00	0.010	0.876	-1.088	0.097	-0.591	0.145	484.0-	0.471	0.276	11.0	0.00
3	0.344	0.716			1.129	0.474	0.531	0.170	0.524	0.973	0.278	188.0	0.586
2.5					1.359	0.549	0.617	0.208	0.655	1.045	0.332	1.028	0.782
Vt-8188	-0.342	-0.315	0.045		-0.631	0.160	-0.670	0.141	-0.647	0.856	971.0	6.417	7
Vt-AAD	0.366		0.048		0.742	0.270	0.670	0.158	0.650	0.866	0.148	0.597	0.471
Vt-2VS	0.426	0.774	0.055	0.632	0.869	0.335	0.683	0.183	0.723	906.0	0.191	0.712	0.608
3.5	1 × 00					•							
Bies	No. 1-1.10	-0.035	-0.112	795 7 71 0.564	. Kros 3	444-F0F	2	274	101	0,0	6	6	•
3	0.312		0.222			75 4 0	0.208	7	244	441	20.0	3:5	10.0
2vS	9.364		0.264		0.639	0.529	0.246	0.525	0.551	0.190	0.083	200	0.476
Wt-2140	-0.274	•	0.069		-0.107	-0.057	-0.196	0.322	-0.162	-0.083	0.112	108	900
Vt-AAD	0.301	0.374	0.152		0.268	0.226	0.219	0.392	0.442	0.123	0.112	0.282	0.265
We-Rys	0.362	0.41	0.177	0.378	0.341	0.288	0.259	0.454	0.528	0.152	0.118	0.337	0.342
	1												

This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Note. Table 58.

TABLE A-2. Raw-Score Deviation Analyses for Equipercentile Equating Tables

	ß	VΥ	νk	2	S	ន	V	쳪	ž	12	7,	ASQT	Average
2	on of R	158 1	able fr	OR AVE	714 000	14.							
Bias	0.389	-0.003	0.05	-	-0	7				•	:		•
	0.507	0.325	0.141	5	0.647	15.0		200				-0.362	0.02
	0.785	0.366	0.169	0.370	0.743						2.5		74.0
11.00	-0.050	-0.145	-0.042	0.705	9 3 4 6	23.0					0.7.0		0.534
	0.158	0.348	0.133	0.279	0.544	0.733	484						60.0
	0.229	0.386	0.148	0.129	0.229 0.386 0.148 0.329 0.629 0	0.247		0.274	0.327	0.87	0.151	0.412	0.443
Deviation	on of El	2 269 7	able Cr	40.	of RIC 269 Table from Assesses at Cityle	Tehle							
3128	0.335	0.303	-0.239	0.716	-0.951	517.0	0.036	5	9	101			•
383	0.4.0	0.360	0 363		: :					747.0	771.0	0.245	0.0
S S	0.557	0.398	0.325		0.768 1.002		2.0	0.503	0.613	0.371	0.165	105.0	0.459
V:-8144	A1.0		5		000		70.0			50.0	0.237	291.1	0.65
AK-AAD	0.214	2.0			35.	60.0	•	•	-6.583	0.387	0.13	-0.464	0.118
SKA-17	178	41.4			756-1		77.0	27.0	200	0.389	0.142	0.485	0.428
}		•					0.133		0.607	0.421	0.164	0.513	0.626
Seriation .	Do of El	rc 370 1	able fr	OB AVE	Deviation of RIC 370 Table from Average 2TC	Table							
31.49	-0.764	-0.042	-0.031	1.060	0.991		5.6.0	0.271	0.275	-0.40S	0.131	422 0-	
3	1.038	0.133	0.295	_		0.231	0.926		0.420			7.00	
25	1.465	0.213	0.395	-		0.237			AAA.	244	2.6		
Vt-3100	0.096	0.052	0.213	_	1.596	0.206			0.275				
¥t-XD	0.411	0.073	0.118	1.543		0.206			0.180				
t-105	0.538	0.126 0.241	0.241	_		0.210	0.846	0.434	0.408	0.679	0.665	1.657	0.93
Sevies (30 00	184 0			Deviation of RTC 481 Table (res Assessed at							•	
	964) 14 × 00 × 00 × 00 × 00 × 00 × 00 × 00 ×	21001	;	•			,		
					20.0	7.5	198.0		0.315	-0.787	0.065	1.343	0.157
3 5		6 00.0				0.13/			264.0	0.787	0.555	1.545	0.696
3	0.751	0.436	0.635	. 505		0.239		0.809	0.56	0.838	0.694	2.282	1.013
KC-3148	-0.032	-0.036	0.032	-1.350		0.13			0.53	-0.680	-0.368	-0.121	0.01
97-38	0.139		0.166	1.354		0.169			0.535	0.680	0.469	0.351	0.503
Vt-LYS	0.137	0.184	0.265	1.549	0.675	0.191	0.712		0.538	0.691	0.528	0.519	0.620
Seviatio	on of Ri	IC 592 1	able fr	TOB AVE	Deviation of RTC 592 Table from Average RTC Table	Table							
31.00	-0.042	7.4.0	-0.051	-0.706	-0.556	-0.072	-1.139	411.0-	24.0	3	121	1000	9
3	0.232	0.601	0.309	0.711	0.555	0.311	1.139		0 477	> > >		776.0	
25	0.271	0.774	0.390	0.408	0.752	0.341	1,166		27.0				2.0
Vt-3144	-0.168	-0.145	0.214	-0.4.0-	2,7	5						177:-	
K-18	0.182	2 0.325 0.254 0.432	0.254	0.417	0.23	2.0			7				9.222
Ve-RMS	0.190	0 433						2.5		76.7.5	3	77	0.323
!!!	,		0.763	444	-	756.0	0 303	617	. 67	• • • •			

TABLE A-2. (Concluded)

Deviation of RIC 603 Table from Average RIC Table ADD ADD ADD ADD ADD ADD ADD A		SS	7	7.5	2	오	cs	VS	Ř	ЖС	13	3A.	Mat	Average
0.430 0.024 -0.145 -0.145 0.408 0.478 -0.124 -0.432 -0.006 0.419 0.438 -0.101 0.760 0.680 0.220 0.239 0.435 0.440 0.374 0.437 0.441 0.197 0.441 0.195 0.420 0.439 0.436 0.446 0.474 0.197 0.441 0.195 0.420 0.439 0.449	7	9	C 603 1	Table fo	TOR AVE	Ke RTC	Table							
0.650 0.2200 0.239 0.456 0.460 0.280 0.528 0.277 0.417 0.558 0.506 1.147 0.0013 0.2200 0.239 0.456 0.456 0.450 0.2	3140	0.430	0.034	-0.145	-0.098	5.478	-0.248	-0.452		0.419		-0.101		121
0.0.54 0.230 0.135 0.138 0.662 0.116 0.774 0.301 0.545 0.441 0.197 1.514 0.042 0.189 0.189 0.199 0.199 0.199 0.191 0.195 0.199 0.191 0.195 0.195 0.191 0.195	3	0.680	0.220	0.293	0.456	0.480		0.528		0.427		0.340		0.437
1-0.013 -0.009 -0.139 -0.414 0.196 -0.139 -0.003 0.044 0.475 0.124 -0.139 -0.155 0.134 0.195 0.139 0.130 0.134 0.135 0.136 0.130 0.135 0.134 0.135 0.136 0.130 0.130 0.135 0.134 0.135 0.136 0.130 0.130 0.135 0.134 0.135 0.136 0.135 0.130 0.130 0.135 0.137 0.130 0.135 0.136 0.135 0.136 0.139 0.1	2	0.843					0.316	0.774		0.545		0.397		0.467
0.352 0.184 0.295 0.497 0.200 0.205 0.205 0.245 0.482 0.245 0.356 0.357 0.367 0.352 0.442 0.207 0.108 0.351 0.351 0.207 0.108 0.351 0.207 0.108 0.351 0.207 0.108 0.351 0.207 0.108 0.207 0.108 0.208 0.207 0.109 0.207 0.109 0.207 0.109 0.207 0.109 0.207 0.109 0.208 0.208 0.208 0.208 0.208 0.208 0.209 0.208	Vt-8148	-0.013					6.33	-0.033		0.475	0.242	97.0	-0.365	660
0.442 0.207 0.103 0.535 0.315 0.401 0.295 0.272 0.532 0.277 0.157 0.157 0.152 0.004 0.402 0.207 0.103 0.207 0.103 0.305 0.305 0.207 0.103 0.205 0.205	¥t-140	0.352					0.390	0.205		0.482	0.242	0.350	0.524	211.0
Compact Registry Compact Compact Compact Compact Compact Compact Registry Compact R	¥t-14S	0.442	0				0.401		0.272	0.582	0.277	0.367	0.532	0.405
0.407 0.997 -1.134 -0.155 -0.614 0.059 -0.258 -0.240 1.030 0.1115 -0.951 1.055 1.212 1.100 1.035 1.212 1.100 1.035 1.212 1.205 1.215 1.205 0.258 0.545 1.151 0.255 1.212 1.205 1.215 0.155 1.215 0.155 1.215 0.155 1.215 0.155	Derfatte	on of As	•	1.0.0.0.0	***	700 / 640			4		7			
1.100 1.089 1.233 0.424 0.847 0.167 0.653 0.532 1.039 0.191 1.055 1.232 1.206 1.257 1.356 0.510 0.938 0.589 0.689 1.173 0.466 1.308 1.431 0.505 1.232 1.236 0.539 0.531 0.535 0.589 0.649 1.173 0.466 1.308 1.431 0.535 1.232 0.535 0.531 0.535 0.535 0.544 1.252 0.134 0.657 0.135 0.997 0.535 0.1360 0.988 0.553 1.171 0.331 0.237 0.237 0.997 0.535 0.180 0.988 0.553 1.171 0.331 0.297 0.597 0.595 0.5180 0.988 0.544 1.234 0.410 1.113 0.997 0.997 0.431 1.133 1.282 0.590 0.169 -0.239 0.014 0.341 1.223 0.506 1.006 0.624 1.555 1.463 1.347 0.997 0.546 0.432 0.973 0.977 1.366 0.924 1.254 1.456 1.753 1.463 1.347 0.997 0.546 0.432 0.977 0.377 1.366 0.924 1.254 1.456 1.753 1.463 1.347 0.997 0.546 0.432 0.977 0.377 0.937 0.935 0.918 0.935 0.935 1.665 1.302 1.095 0.523 0.271 0.894 0.792 1.816 1.108 1.322 1.392 1.465 1.765 1.302 1.095 0.523 0.271 0.894 0.792 1.816 1.108 1.322 1.392 1.465 1.302 1.095 0.523 0.271 0.894 0.792 1.816 1.108 1.322 1.392 1.465 1.302 1.095 0.523 0.271 0.894 0.792 0.804 0.995 0.904 0.995 0.904 0.995 0.904 0.995 0.905 0.9	8146	407	. 0	-1.194	0.135	-0.614		851.00	107 200		:		•	•
1.206 1.237 1.366 0.510 0.928 0.595 0.695 0.644 1.127 0.466 1.305 1.431 1.0206 1.337 1.366 0.510 0.938 0.595 0.644 1.127 0.466 1.309 1.431 0.2921 1.395 0.939 0.595 0.644 1.224 0.410 1.113 0.997 0.921 1.395 0.939 0.510 0.593 0.100 0.498 0.561 1.171 0.351 0.137 0.295 0.190 0.498 0.561 1.171 0.351 0.193 0.625 1.02921 1.489 1.310 0.605 1.005 0.130 0.130 0.131 0.131 0.292 1.489 1.310 0.605 1.005 0.130 0.130 0.137 1.366 0.924 1.224 1.224 0.491 1.113 0.120 0.134 0.137 0.136 0.137 1.366 0.924 1.235 1.463 1.347 0.917 0.146 0.132 0.037 1.366 0.924 1.224 1.225 1.463 1.347 0.917 0.146 0.159 0.037 1.366 0.924 1.325 1.463 1.347 0.917 0.109 0.101 0.137 1.366 0.924 1.325 1.463 1.347 0.917 0.109 0.101 0.	3	1.100			474.0	244		204					768.0-	76.7
1 0.250 1.335 -0.316 0.055 -0.550 0.161 -0.103 -0.246 1.162 0.014 -0.667 -0.142 1.029 1.489 1.310 0.605 1.005 0.310 0.588 0.644 1.254 0.410 1.115 0.997 1.029 1.489 1.310 0.605 1.005 0.310 0.588 0.644 1.254 0.410 1.115 0.997 0.605 1.005 0.310 0.588 0.644 1.254 0.410 1.115 0.997 0.605 1.005 0.310 0.588 0.644 1.254 0.410 1.115 0.997 0.411 1.131 1.182 0.540 0.169 -0.239 0.014 0.341 -1.223 0.506 1.006 0.624 1.355 1.351 1.381 0.340 0.352 0.997 0.345 0.325 1.366 0.924 1.354 1.465 1.345 1.345 1.345 0.397 0.616 0.569 1.067 0.398 0.398 0.398 1.365 1.307 1.055 1.307 0.307 0.301 0.398 0.345 1.321 0.321 0.331 0.	253	1.206			0.510	0.628	200	666	7,7		200		1.712	0.830
0.921 i.396 0.975 0.510 0.955 0.180 0.498 0.563 i.171 0.551 0.505 0.997 0.505 0.4029 0.588 0.644 0.254 0.410 0.1115 0.997 0.505 0.402 0.402 0.402 0.405 0.505 0.505 0.404 0.254 0.410 0.1115 0.997 0.411 -1.133 0.506 0.569 0.505 0.644 0.252 0.401 0.1115 0.997 0.624 0.413 0.414 0.413 0.414 0.413 0.414 0.413 0.414 0.414 0.413 0.414 0.413 0.414 0	Vt-1160	0.130	_		0.055	0	181	-0.101	246					200.0
1.029 1.489 1.310 0.605 1.005 0.330 0.588 0.644 1.234 0.410 1.113 0.997 1.03 of REPS Experimental Table from 8a 0.431 -1.133 1.282 0.540 0.169 -0.259 0.014 0.341 -1.233 0.506 1.006 0.624 1.552 1.463 1.347 0.317 0.546 0.452 0.973 0.737 1.566 0.924 1.254 1.456 1.713 1.741 1.653 1.099 0.616 0.569 1.063 0.822 1.561 1.067 1.550 1.664 1.713 1.741 1.653 1.099 0.616 0.569 1.063 0.732 1.816 1.108 1.322 1.251 1.408 1.934 1.573 1.221 0.659 0.231 0.984 0.752 1.816 1.108 1.322 1.252 1.408 1.934 1.575 1.221 0.659 0.231 0.982 0.245 1.816 1.108 1.322 1.252 1.408 1.934 1.575 1.221 0.659 0.231 0.249 -0.193 0.620 0.032 -0.268 0.024 -0.135 0.067 0.335 -0.445 0.561 0.646 0.197 0.193 0.620 0.103 0.608 0.052 0.080 0.164 0.671 1.102 0.712 0.704 0.113 0.809 0.804 0.196 0.164 0.470 0.759 0.134 0.505 0.782 0.247 0.706 0.197 0.706 0.938 0.314 0.504 0.400 0.700 0.134 0.566 0.938 0.330 0.735 0.209 0.786 0.958 0.348 0.535 0.104 0.665 0.938 0.330 0.735 0.247 0.706 0.196 0.938 0.348 0.506 0.105 0.031 0.134 0.566 0.938 0.330 0.752 0.209 0.786 0.958 0.348 0.506 0.409 0.662 0.608 0.104 0.566 0.938 0.330 0.730 0.804 0.908 0.348 0.506 0.409 0.662 0.608 0.104 0.509 0.509 0.500 0.134 0.313 0.606 0.409 0.668 0.204 0.348 0.792 0.643 0.237 0.400 0.804 0.100 -0.105 0.355 0.421 0.106 0.074 0.135 0.077 0.026 0.441 0.698 0.377 0.007 0.452 1.167 0.355 0.316 0.078 0.318 0.792 0.648 0.441 0.498 0.127 0.221 0.275 0.355 0.316 0.489 0.214 0.313 0.416 0.311 0.275 0.318 0.377	4t-140	0.921	-	0.935	0.510	0.955	0.180	0.498	0.563				7	
1.352 1.463 1.347 0.316 0.169 -0.239 0.014 0.341 -1.223 0.506 1.006 0.624 1.352 1.463 1.347 0.317 0.346 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.347 0.317 0.346 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.347 0.317 0.346 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.347 0.317 0.346 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.725 1.625 0.335 0.307 0.021 -0.517 0.439 -1.815 0.918 0.958 -0.093 1.257 1.725 1.322 1.099 0.616 0.569 0.373 0.732 1.815 1.108 1.322 1.292 1.237 1.755 1.302 1.095 0.227 0.231 0.732 1.891 1.221 1.559 1.466 0.0024 -0.137 0.003 0.007 0.035 0.244 0.007 0.0092 0.0045 1.973 1.201 0.007 0.004 0.197 0.726 0.602 0.003 0.007 0.0	VC-PMS	1.029	_	1.310	0.605	1.005	0.330	0.588	0.644		0.410		265.0	0.967
1.35	•	•	4										•	
1.352 1.463 1.347 0.917 0.169 -0.259 0.014 0.341 -1.223 0.506 1.006 0.624 1.552 1.463 1.347 0.917 0.546 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.715 1.741 1.655 0.917 0.546 0.452 0.973 0.737 1.366 0.924 1.254 1.456 1.715 1.741 1.655 0.935 0.616 0.624 0.517 0.409 -1.725 1.162 0.335 0.307 0.021 -0.517 0.439 -1.815 0.918 0.958 -0.059 1.664 0.727 1.765 1.302 1.095 0.523 0.271 0.894 0.752 1.816 1.108 1.322 1.292 1.408 1.934 1.575 1.221 0.659 0.333 0.271 0.802 0.845 1.891 1.221 1.358 1.466 0.024 -0.135 0.087 0.355 -0.445 0.049 -0.345 0.101 -0.193 0.620 0.032 -0.268 0.573 0.773 0.138 0.974 0.510 0.648 0.197 0.726 0.682 0.318 0.472 0.657 0.194 0.197 0.726 0.682 0.318 0.472 0.657 0.164 0.671 1.102 0.772 0.704 0.131 0.639 0.867 0.154 -0.444 0.573 0.773 0.773 0.775 0.575 0.374 0.771 0.152 0.245 0.785 0.987 0.316 0.470 0.765 0.194 0.197 0.726 0.808 0.316 0.244 0.444 0.573 0.773 0.773 0.786 0.987 0.318 0.318 0.314 0.203 0.762 0.762 0.772 0.704 0.118 0.659 0.807 0.314 0.315 0.404 0.313 0.385 0.344 0.203 0.786 0.396 0.344 0.203 0.786 0.396 0.344 0.203 0.786 0.396 0.344 0.203 0.346 0.396 0.396 0.398 0.348 0.396 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.398 0.399	De 91 85 1	Z 10 00	LPS Exp	erlaent	al Tabl	from								
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1.257 1.755 1.152 0.335 0.307 0.021 -0.517 0.439 -1.815 0.918 0.958 -0.093 1.408 1.924 1.755 1.765 1.302 1.095 0.523 0.271 0.894 0.752 1.816 1.108 1.322 1.292 1.408 1.934 1.575 1.210 0.609 0.323 0.271 0.894 0.752 1.816 1.108 1.322 1.292 1.406 1.934 1.934 1.575 1.221 0.609 0.333 0.271 0.982 0.845 1.891 1.221 1.558 1.466 0.024 -0.135 0.007 0.395 -0.445 0.049 0.045 0.197 0.726 0.622 0.318 0.472 0.057 0.735 0.394 0.501 0.609 0.101 -0.193 0.622 0.318 0.472 0.652 0.808 0.164 0.671 1.102 0.772 0.704 0.139 0.809 0.804 0.396 0.603 0.573 0.735 0.745 0.759 0.807 0.128 0.314 0.474 0.470 0.769 0.104 0.701 0.152 0.247 0.708 0.196 0.750 0.838 0.312 0.444 0.450 0.759 0.807 0.128 0.314 0.207 0.752 0.209 0.786 0.998 0.314 0.394 0.395 0.304 0.309 0.786 0.998 0.314 0.207 0.701		1.715	-	-			0.569		0.822	_	1.067			1.328
1.257 1.765 1.302 1.095 0.523 0.271 0.834 0.752 1.816 1.108 1.322 1.292 1.408 1.934 1.575 1.221 0.669 0.333 0.982 0.845 1.891 1.221 1.558 1.466 1.908 1.934 1.575 1.221 0.669 0.333 0.982 0.845 1.891 1.221 1.558 1.466 0.0024 -0.135 0.0057 0.395 -0.446 0.0024 -0.135 0.0057 0.395 -0.446 0.0057 0.395 0.049 0.197 0.726 0.682 0.318 0.472 0.562 0.808 0.164 0.671 1.102 0.772 0.704 0.131 0.839 0.807 0.396 0.104 0.472 0.0055 0.374 -0.701 0.152 -0.668 0.128 -0.659 0.807 0.314 0.404 0.407 0.769 0.134 0.500 0.762 0.247 0.708 0.196 0.199 0.805 0.314 0.505 0.104 0.505 0.104 0.606 0.938 0.310 0.752 0.209 0.786 0.998 0.348 0.585 0.104 0.501 0.805 0.104 0.102 0.704 0.102 0.704 0.107 0.704 0.107 0.704 0.107 0.704 0.107 0.704 0.107 0.707	_	0.00	7	~			0.021		0.439	7	0.918	0.958		0.034
1.408 1.934 1.575 1.221 0.669 0.333 0.982 0.845 1.891 1.221 1.558 1.466 1.00 of MCPS Experimental Table from Average RIC Table 0.024 -0.135 0.087 0.395 -0.445 0.049 -0.345 0.191 0.620 0.052 -0.268 0.573 0.733 0.128 0.374 0.561 0.648 0.197 0.726 0.682 0.318 0.472 0.662 0.808 0.164 0.671 1.102 0.712 0.704 0.213 0.809 0.804 0.396 0.605 0.652 0.808 0.164 0.671 1.102 0.712 0.708 0.191 0.629 0.804 0.396 0.605 0.653 0.747 0.769 0.134 0.560 0.762 0.247 0.708 0.196 0.750 0.838 0.312 0.494 0.470 0.769 0.134 0.560 0.762 0.247 0.708 0.196 0.750 0.838 0.312 0.494 0.503 0.855 0.1.4 0.666 0.938 0.330 0.752 0.209 0.786 0.958 0.348 0.585 0.308 o.127 0.033 0.234 0.202 -0.297 -0.122 0.243 0.001 -0.087 0.093 0.894 0.365 0.421 0.169 0.296 0.285 0.386 0.196 0.418 0.600 0.134 0.313 0.836 0.409 0.468 0.204 0.348 0.792 0.643 0.237 0.460 0.834 0.200 0.452 1.167 0.035 0.400 0.192 0.299 0.349 0.177 0.248 0.443 0.479 0.177 0.201 0.275 0.376 0.489 0.214 0.313 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377		1.257	_	_			0.271		0.732	1.81	1.108	1.322		1.117
0.024 -0.135 0.087 0.395 -0.445 0.049 -0.345 0.101 -0.193 0.620 0.052 -0.268 0.057 0.395 -0.445 0.045 0.0145 0.101 -0.193 0.620 0.052 -0.268 0.573 0.773 0.128 0.575 0.574 0.561 0.648 0.197 0.726 0.682 0.318 0.472 0.662 0.808 0.164 0.671 1.102 0.772 0.704 0.213 0.809 0.804 0.396 0.605 0.605 0.104 0.472 0.655 0.104 0.102 0.712 0.704 0.128 0.659 0.807 0.306 0.104 0.401 0.470 0.769 0.134 0.500 0.762 0.247 0.708 0.196 0.790 0.838 0.312 0.404 0.401 0.709 0.104 0.606 0.908 0.300 0.705 0.106 0.700 0.700 0.700 0.104 0.501 0.700 0.700 0.104 0.700 0.104 0.107 0.700 0.104 0.107 0.700 0.104 0.107 0.1		1.408	_		1.22	0.609	0.333	0.982	0.845	1.891	1.221	1.558		1.31
0.024 -0.135 0.087 0.385 -0.445 0.049 -0.345 0.101 -0.193 0.620 0.052 -0.168 0.573 0.733 0.128 0.575 0.844 0.197 0.726 0.682 0.318 0.472 0.573 0.733 0.128 0.575 0.874 0.561 0.648 0.197 0.726 0.682 0.318 0.472 0.662 0.805 0.807 0.154 0.513 0.655 0.154 -0.444 0.457 0.769 0.186 0.152 -0.668 0.128 -0.659 0.867 0.154 -0.444 0.470 0.769 0.134 0.500 0.762 0.247 0.708 0.196 0.730 0.838 0.312 0.494 0.503 0.855 0.134 0.566 0.988 0.310 0.752 0.209 0.786 0.958 0.314 0.585 0.305 0.505 0.134 0.505 0.134 0.207 0.752 0.209 0.786 0.958 0.348 0.595 0.305 0.134 0.207 0.207 0.305 0.418 0.594 0.305 0.418 0.594 0.395 0.407 0.105 0.207 0.4	Devise	20 00 00	PS Expe	er faent.				440	-					
0.573 0.773 0.128 0.575 0.574 0.561 0.646 0.197 0.715 0.662 0.198 0.472 0.662 0.808 0.164 0.671 1.102 0.712 0.704 0.191 0.705 0.682 0.198 0.472 0.662 0.808 0.164 0.671 1.102 0.712 0.704 0.213 0.809 0.804 0.194 0.404 0.405 0.675 0.105 0.605 0.105 0.605 0.105	31.48	0.024	6.135	0.087		9			2	5	65			
0.662 0.808 0.164 0.671 1.102 0.712 0.704 0.113 0.452 0.608 0.154 0.675 0.154 0.608 0.608 0.608 0.108	97	0.573	0.711					77.0					207.0	800
-0.357 -0.420 0.055 0.374 -0.701 0.152 -0.666 0.128 -0.659 0.1607 0.154 0.144 0.507 0.769 0.134 0.560 0.762 0.252 0.0568 0.134 0.152 0.444 0.507 0.769 0.134 0.560 0.762 0.209 0.785 0.130 0.888 0.312 0.494 0.503 0.154 0.566 0.988 0.310 0.752 0.209 0.786 0.988 0.314 0.385 0.154 0.205 0.785 0.998 0.305 0.365 0.132 0.207 0.785 0.209 0.785 0.998 0.394 0.595 0.394 0.207 0.394 0.305 0.485 0.297 -0.122 0.241 0.061 -0.087 -0.091 0.594 0.365 0.412 0.412 0.416 0.690 0.413 0.413 0.816 0.418 0.600 0.412 0.313 0.816 0.418 0.600 0.412 0.313 0.416 0.313 0.314 0.315 0.317 0.207 0.410 0.107 0.211 0.315 0.317	Z	0.662	0.808					200			780.0	318	0.472	0.541
0.470 0.769 0.134 0.560 0.762 0.247 0.706 0.156 0.750 0.838 0.312 0.494 0.503 0.855 0.104 0.666 0.988 0.310 0.752 0.209 0.786 0.998 0.314 0.565 0.998 0.310 0.595 0.209 0.786 0.998 0.314 0.385 0.348 0.385 0.348 0.385 0.348 0.385 0.348 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.385 0.418 0.601 -0.087 -0.091 0.594 0.385 0.485 0.485 0.485 0.485 0.395 0.395 0.395 0.495 0.313 0.835 0.405 0.385 0.395 0.314 0.313 0.835 0.405 0.315 0.074 0.315 -0.207 0.405 0.315 -0.377 0.074 0.315 -0.377 0.248 0.443 0.498 0.327 0.289 0.335 0.445 0.389 0.337 0.446 0.333 0.449 0.214 0.333 0.445 0.487 0.565 0.378 0.337	¥t-3143	-0.357	-0.423									27.	503.0	0.657
0.553 0.855 0.154 0.666 0.988 0.310 0.752 0.209 0.786 0.988 0.348 0.585 0.365 0.365 0.154 0.666 0.988 0.310 0.752 0.209 0.786 0.988 0.348 0.585 0.365 0.365 0.365 0.365 0.241 0.061 -0.087 -0.091 0.594 0.365 0.412 0.241 0.061 -0.087 0.313 0.836 0.365 0.418 0.650 0.134 0.313 0.836 0.405 0.418 0.650 0.134 0.313 0.836 0.405 0.418 0.600 0.434 0.313 0.836 0.405 0.405 0.405 0.405 0.405 0.405 0.105 0.405 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.105 0.315 0.405 0.315 0.3	Wt-AU	0.470	0.769						201.0) ·	• • • • • • • • • • • • • • • • • • • •	****	97.0
tion of MEPS Experimental Table from Same-Porm RTC Table -0.155 -0.132 0.033 0.234 0.202 -0.297 -0.122 0.241 0.061 -0.087 -0.093 0.594 0.365 0.421 0.169 0.296 0.585 0.586 0.196 0.418 0.680 0.134 0.313 0.836 0.409 0.408 0.204 0.198 0.792 0.643 0.237 0.460 0.834 0.200 0.452 1.167 0.409 0.406 0.192 0.289 0.319 0.177 0.248 0.443 0.498 0.127 0.221 0.275 0.376 0.499 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	Vt-RYS	0.533	0.855				0.330	0.752	0.70	286		715.0		0.524
cion of MEPS Experimental Table from Same-Porm RTC Table -0.165 -0.112 0.033 0.234 0.202 -0.297 -0.112 0.241 0.061 -0.087 -0.093 0.594 -0.365 0.421 0.169 0.296 0.585 0.586 0.196 0.418 0.680 0.134 0.313 0.836 0.409 0.408 0.104 0.134 0.792 0.643 0.237 0.460 0.834 0.200 0.452 1.167 -0.353 -0.316 0.074 0.135 -0.073 -0.070 -0.214 0.315 -0.377 -0.074 0.110 -0.105 -0.353 0.440 0.192 0.289 0.349 0.177 0.248 0.443 0.498 0.178 0.255 0.377										3		7	3	20.0
-0.365 -0.132 0.033 0.234 0.202 -0.297 -0.122 0.241 0.061 -0.087 -0.091 0.594 0.365 0.421 0.169 0.296 0.585 0.586 0.196 0.418 0.650 0.134 0.313 0.836 0.405 0.408 0.668 0.204 0.348 0.792 0.643 0.237 0.460 0.834 0.200 0.452 1.167 0.033 -0.316 0.074 0.155 -0.073 -0.074 0.315 -0.317 -0.074 0.110 -0.105 0.353 0.440 0.192 0.289 0.319 0.177 0.248 0.443 0.478 0.127 0.221 0.275 0.377 0.376 0.499 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	7	気 70 gc	PS Exp	erfaent	il Table		101-357	T RIC I	able					
0.365 0.421 0.169 0.296 0.585 0.196 0.418 0.650 0.134 0.313 0.836 0.409 0.408 0.656 0.134 0.313 0.836 0.409 0.468 0.204 0.348 0.792 0.643 0.237 0.460 0.834 0.200 0.452 1.167 0.353 -0.316 0.074 0.155 -0.073 -0.214 0.315 -0.377 -0.074 0.110 -0.105 0.353 0.440 0.192 0.289 0.319 0.177 0.248 0.443 0.478 0.127 0.221 0.275 0.376 0.499 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	_	-0.365	-0.132				-0.297	0.122	0.241	0.061	0.087	60.0	0.594	1,00
0.409 0.468 0.204 0.348 0.792 0.543 0.237 0.460 0.834 0.200 0.452 1.167	3	0.365					0.586		0.418	0.630	0.134	0.11	0.836	0.417
** -0.353 -0.316 0.074 0.155 -0.073 -0.070 -0.214 0.315 -0.377 -0.074 0.110 -0.105 -0.353 0.440 0.192 0.289 0.1349 0.177 0.248 0.443 0.478 0.127 0.221 0.275 0.375 0.489 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	Z.	0.409					0.643		0.460	0.834	0.200	0.453	1.167	004
0.353 0.440 0.192 0.289 0.349 0.177 0.248 0.443 0.498 0.127 0.221 0.275 0.376 0.489 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	Vt-3188	-0.333	•			-	9.070	9.77	0.315		-0.074	0.1.0	9	
0.376 0.489 0.214 0.333 0.416 0.313 0.279 0.487 0.565 0.178 0.255 0.377	4c-AAD	0.333					0.177	0.248	0.443		0.127	,	7,7	
	VC-RXS	0.376					0.113	0.779	0 487	***			7.7.0	
				,) • • •	•	•		; ;	•	•	(())	0.37	0.373

This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Note. Table 59.

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TABLE A-3. Composite-Score Deviation Analyses for Linear Equating Tables

Deviation of NIC 138 Table from Average NIC Table Deviation of NIC 138 Table from Average NIC Table Deviation of NIC 138 Table from Average NIC Table Deviate O.139 O.140 O.130 O.		1527	ARGA	AZEL	אאכו	ARFY	ARSC	ASCO 150	ASSA.	AROF	ARST	7. 2.0.2	7.00 00 00 00 00 00 00 00 00 00 00 00 00	HCFA	F57	Avetage
13 0.155 0.455 0.255	Deviati	7	TC 158 T	able fr	OB AVET	ege RIC	Table	100	800	L	70.	0		3		
Color Colo			,			650.01	60.0	****	, , , , , , , , , , , , , , , , , , ,		901.0	20.0-	111.0-	701.0-	-0.10	0.089
1.0 1.0	} ;	1000	20.0		67.0	7.0		70/.0	20.0		2.5	0	0.120	0.15	0.306	0.393
Color Colo	ר בי		777.0			0.700	6,7.0	2000	200		27.0	0.509	60.10	0.153	0.353	0.526
1110 of RTC 259 1218 0.119 0.119 0.110 0.120 0.139 0.139 0.139 0.119 0.127 0.102 0.112 0.107 0.100 0.109 0.108 0.109 0.118 0.109 0.119 0.1		20.00	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7.0-		670.0-	711.0-	9.0.9	-0.059		121.0-	-0.086	-0.102	-0.1	0.138	-0.105
Color Colo				0.137	6110	601.0	0.125	0.309	0.339		0.161	0.207	0.102	0.112	0.177	0.178
-0.018 -0.036 -0.138 0.039 -0.645 0.045 -0.155 -0.204 0.014 -0.105 -0.076 0.050 0.023 -0.113 0.1	Vt-245	0.10		0.228	0.143	0.131	0.144	0.372	0.411		0.193	0.247	0.102	0.123	0.203	0.232
-0.018 -0.029 -0.128 0.030 -0.045 0.047 0.018 -0.104 0.014 -0.105 -0.076 0.050 0.033 0.123 0.133 0.133 0.134 0.132 0.133 0.134 0.135 0.135 0.131 0.134 0.134 0.134 0.134 0.134 0.135 0.135 0.131 0.134 0.134 0.134 0.134 0.134 0.135 0.130 0.134	Deviati	on of R	rc 269 T	Table fr		see RTC										
0.112 0.155 0.154 0.157 0.152 0.173 0.444 0.171 0.791 0.193 0.820 0.225 0.182 0.135	8140	0.018	-0.030	-0.128	6	-0.045		0.155	-0.204	410.0	501.0	-0.076	0,0	C	?	50
0-153 0-192 0-415 0-343 0-614 0-437 0-531 0-255 0-901 0-666 0-947 0-134 0-442 0-497 0-203 0-018 0-003 0-018 0-022 0-118 0-220 0-208 0-2080 0-0148 0-003 0-018 0-022 0-118 0-220 0-2080 0-0180 0-0180 0-0181 0-024 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220 0-118 0-220	3	0.132			0.297	0.532	0.373	474.0	0.217	0.781	0.523	0.870	2.5	28.0	2 2 2	0.4
Control Cont	273	0.133			0.343	0.614	0.437	0.521	0.255	0.00	909	270	13.6	7 7 7	200	
UN 0.037 0.035 0.181 0.099 0.122 0.112 0.225 0.200 0.135 0.231 0.189 0.099 0.151 0.181 0.181 0.233 0.068 0.112 0.223 0.124 0.267 0.142 0.259 0.201 0.315 0.280 0.464 0.114 0.183 0.187 0.233 0.068 0.112 0.223 0.124 0.267 0.142 0.205 0.201 0.315 0.215 0.101 0.1	Kr-Bias	•	•	•	400.0	-0.115	400	-0 - 8 S	200	0.080	141 0-		410	4100	(81.0	
**S 0.068 0.112 0.223 0.124 0.267 0.142 0.269 0.201 0.335 0.280 0.464 0.114 0.183 0.287 **Turns of RTC 370 Table from Average RTC Table	0Y-38				0.099	0.222	0.112	0.725	0.200	0.275	2.7	280	0.0	20.0	701.0	50.0
Color Colo	Vr-Rus	0.068			0.124	0.267	0.142	0.269	0.201	0.335	0.280	0.464	0.114	0.183	0.287	0.242
Court Cour		•		•			- (1					
-0.045 -0.058 -0.059 0.011 0.130 0.033 -0.067 -0.075 -0.012 -0.140 -0.071 0.012 -0.115 -0.115 -0.136 0.135 0.135 0.135 0.130 0.039 0.109 0.1090 0.136 0.034 0.035 0.004 0.048 0.017 -0.138 -0.038 -0.014 -0.128 -0.000 0.034 0.034 -0.092 0.131 0.130 0.131 0.130 0.130 0.131 0.130 0.131 0.130 0.131 0.130 0.131 0.130 0.131 0.130 0.131 0.130 0.131 0.131 0.130 0.131 0.130 0.131 0.130 0.131 0.130 0.131	26 4 1 2 6 7	10 001	2015	Table fr	Ave	186										
0.256 0.135 0.476 0.702 0.620 0.079 0.865 0.608 0.093 0.196 0.170 0.110 0.197 0.707 0.239 0.117 0.656 0.0059 0.0059 0.106 0.0059 0.106 0.0059 0.106 0.0059 0.106 0.0059 0.106 0.0059 0.106 0.0059 0.117 0.165 0.0059 0.0014 0.018 0.0017 0.165 0.0059 0.0014 0.017 0.165 0.0059 0.0	20.10	-0.045	-0.063	ဂ	0.013	0	0.03	0.087			-0.140	-0.071	0.012	-0.115	٩	0.020
0.233 0.170 0.556 0.811 0.730 0.146 1.000 0.704 0.159 0.217 0.169 0.251 0.821 0.203 -0.033 -0.056 0.064 0.048 0.017 -0.158 -0.088 -0.014 -0.128 -0.000 0.034 -0.092 -0.266 0.100 0.000 0.0190 0.239 0.234 0.023 0.344 0.237 0.036 0.149 0.112 0.048 0.101 0.094 0.388 0.100 0.000 0.000 0.190 0.239 0.234 0.023 0.344 0.297 0.036 0.149 0.112 0.048 0.113 0.461 0.100 0.000 0.000 0.190 0.239 0.200 0.287 0.022 0.036 0.149 0.112 0.048 0.113 0.461 1.001 0.000 0.000 0.100 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.122 0.000 0.100 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.123 0.000 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.200 0.221 0.000 0.200 0	3	0.256	0.135	0	0.702	0	0.079	0.865			0.196	0.170	0.110	0.197	0	0.373
Mark	3		0.170	0	0.811	0	0.146	000.1			0.239	0.217	0.163	0.251	0	0.536
ALD 0.100 0.080 0.190 0.215 0.234 0.023 0.354 0.242 0.030 0.112 0.094 0.041 0.096 0.388 RES 0.112 0.095 0.226 0.290 0.287 0.027 0.426 0.297 0.036 0.149 0.112 0.048 0.118 0.461 Lation of RTC 481 Table from Average RTC Table -0.019 0.087 -0.016 -0.030 0.106 0.012 -0.044 0.002 0.076 -0.023 0.022 0.087 0.085 0.259 1.295 -0.158 1.291 0.503 0.297 1.126 0.526 0.127 1.096 0.587 0.868 0.264 0.550 1.295 0.158 1.291 0.503 0.297 0.199 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.158 1.291 0.503 0.207 0.109 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.221 1.486 0.577 0.399 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.221 1.486 0.577 0.399 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.035 0.223 0.205 0.2010 -0.067 -0.045 -0.011 -0.055 -0.045 -0.108 -0.005 -0.057 0.039 0.265 0.223 0.205 0.2010 -0.067 0.248 0.116 0.509 0.205 0.382 0.148 0.283 0.282 0.464 0.331 0.268 0.205 0.249 0.578 0.003 0.003 0.005 0.205 0.205 0.205 0.359 0.377 0.275 0.198 0.205 0.249 0.578 0.001 0.007 0.245 0.199 0.187 0.222 0.132 0.175 0.009 -0.003 -0.178 AAD 0.102 0.187 0.001 0.007 0.245 0.198 0.187 0.222 0.132 0.173 0.181 0.255 0.123 0.132	75-B164	•	-0.076	٩	490.0	0.048	0.017	5.1.28			-0.128	-0.080	0.034	-0.092	P	-0.059
Lation of RTC 481 Table from Average RTC Table -0.019 0.037 -0.016 -0.030 0.187 0.027 0.0426 0.197 0.016 0.149 0.112 0.048 0.113 0.461 -0.019 0.037 -0.016 -0.030 0.106 0.012 -0.044 0.002 0.076 -0.023 0.087 0.005 -0.015 -0.018 1.291 0.057 -0.029 1.126 0.526 0.773 0.321 1.096 0.597 0.868 0.549 0.560 1.139 0.121 1.486 0.577 0.319 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.121 1.486 0.577 0.319 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.628 0.121 1.486 0.577 0.319 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.628 0.221 1.486 0.577 0.319 1.296 0.607 0.923 0.370 1.263 0.379 0.265 0.229 0.221 1.486 0.577 0.001 0.052 0.001 0.005 0.188 0.120 0.199 0.101 0.101 0.010 0.010 EMS 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.101 0.101 0.101 0.101 0.101 0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.523 0.283 0.375 0.313 0.283 0.213 0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.523 0.188 0.178 0.001 0.001 0.001 0.001 0.010 0.111 0.11	VI-AND	0.100		0	0.235	~	0.023	0.354			0.129	0.094	140.0	0.00	O	0.160
STATE 481 Table from Average RTC Table **O.019 0.037 -0.016 from Average RTC Table** **O.019 0.037 -0.016 from Average RTC Table** **O.158 1.291 0.503 0.203 0.106 0.012 0.004 0.005 0.057 0.868 0.249 0.550 1.295 0.158 1.295 0.203 0.203 0.1096 0.597 0.868 0.249 0.550 1.295 0.213 1.495 0.201 0.503 0.203 1.296 0.607 0.923 0.301 1.206 0.678 1.002 0.978 0.648 1.495 0.221 1.486 0.577 0.339 1.296 0.607 0.923 0.302 1.263 0.608 1.002 0.907 0.903 0.608 0.203 0.608 0.203 0.608 0.203 0.608 0.203 0.608 0.203 0.203 0.608 0.703 0.2	Vt-RYS	0.122		0	0.290	7	0.027	0.426			0.149	0.112	0.048	0.113	0	0.235
** -0.019 0.037 -0.016 -0.030 0.106 0.012 -0.044 0.002 0.076 -0.023 0.022 0.087 0.005 -0.015 0.158 1.291 0.500 0.290 1.126 0.526 0.793 0.321 1.096 0.597 0.868 0.569 0.560 1.295 0.500 1.295 0.221 1.486 0.577 0.399 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.221 1.486 0.577 0.399 1.296 0.607 0.923 0.370 1.263 0.678 1.002 0.978 0.648 1.495 0.221 1.486 0.577 0.399 1.296 0.607 0.005 -0.005 -0.007 0	Deviors	lon of R	TC 481 1		λ 00.	TARE RIC	Table									
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Sites -0.010 -0.067 -0.045 -0.011 -0.059 -0.045 -0.108 -0.002 -0.058 -0.062 -0.077 -0.030 -0.055 -0.229 LOD 0.070 0.518 0.204 0.052 0.423 0.163 0.316 0.122 0.376 0.233 0.390 0.265 0.223 0.626 LNS 0.070 0.518 0.204 0.052 0.423 0.163 0.316 0.122 0.376 0.232 0.464 0.331 0.269 0.733 LNS 0.086 0.621 0.248 0.116 0.509 0.205 0.382 0.148 0.458 0.292 0.464 0.331 0.269 0.733 LRELOG OF RIC 592 Table from Average RIC Table 0.0016 -0.050 -0.003 -0.005 -0.255 -0.105 -0.194 -0.114 -0.168 -0.065 -0.193 -0.101 -0.030 -0.205 0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.523 0.283 0.325 0.212 0.722 0.198 0.205 0.249 0.578 0.085 0.220 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.249 0.578 0.001 -0.023 -0.160 -0.019 -0.187 -0.124 -0.128 -0.086 -0.175 0.009 -0.031 -0.178 AAD 0.102 0.187 0.001 0.067 0.245 0.189 0.187 0.222 0.132 0.143 0.175 0.213 0.058 0.173 ZMS 0.123 0.225 0.021 0.054 0.253 0.183 0.272 0.161 0.173 0.181 0.255 0.033 0.182	Z-Z	0.221		0.577	0		0.607	0.923	0.370	1.263	0.678		0.978	0.648	1.495	0.941
UAD 0.070 0.318 0.204 0.052 0.423 0.163 0.316 0.122 0.376 0.233 0.390 0.265 0.223 0.626 EXS 0.086 0.621 0.248 0.116 0.509 0.203 0.382 0.148 0.458 0.292 0.464 0.331 0.269 0.733 Lation of RIC 592 Table from Average RIC Table 0.0016 -0.050 -0.003 -0.005 -0.255 -0.105 -0.114 -0.168 -0.065 -0.193 -0.101 -0.030 -0.205 0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.323 0.283 0.325 0.212 0.722 0.198 0.209 0.249 0.578 0.085 0.220 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.249 0.578 0.001 -0.023 -0.160 -0.019 -0.187 -0.124 -0.128 -0.086 -0.175 0.009 -0.003 -0.178 AAD 0.102 0.187 0.001 0.067 0.245 0.189 0.187 0.222 0.132 0.143 0.175 0.213 0.058 0.173 AAS 0.123 0.225 0.021 0.054 0.253 0.183 0.272 0.161 0.173 0.181 0.255 0.033 0.182	Vt-3144				٩		-0.045	901.0	-0.002	-0.058	-0.062		-0.030	-0.055	0.229	-0.061
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Lation of RIC 592 Table from Average RIC Table 0.015 -0.050 -0.003 -0.005 -0.255 -0.156 -0.194 -0.114 -0.168 -0.065 -0.193 -0.101 -0.030 -0.205 0.249 0.496 0.014 0.191 0.649 0.706 0.205 0.523 0.283 0.325 0.212 0.722 0.198 0.209 0.249 0.578 0.085 0.220 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.249 0.578 0.001 -0.023 -0.160 -0.018 -0.184 -0.128 -0.086 -0.175 0.009 -0.031 -0.178 AAD 0.102 0.187 0.001 0.067 0.245 0.198 0.187 0.222 0.132 0.143 0.175 0.213 0.058 0.173 AAS 0.123 0.225 0.001 0.054 0.203 0.183 0.183 0.272 0.161 0.173 0.181 0.255 0.003 0.182	Vt-RYS	0.036		0.248	0		0.205	0.332	0.143	0.458	0.232		0.331	0.268	0.733	0.334
• 0.016 -0.050 -0.003 -0.005 -0.155 -0.105 -0.114 -0.168 -0.065 -0.193 -0.101 -0.030 -0.205 -0.205 -0.205 -0.205 -0.193 -0.101 -0.030 -0.205 -0.205 -0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.523 0.283 0.325 0.312 0.772 0.198 0.209 0.249 0.578 0.085 0.270 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.265 0.003 0.015 0.001 -0.023 -0.160 -0.017 -0.124 -0.128 -0.086 -0.175 0.009 -0.003 -0.178 AD 0.102 0.187 0.001 0.067 0.245 0.198 0.187 0.222 0.132 0.143 0.175 0.213 0.058 0.173 0.181 0.225 0.031 0.054 0.182 0.182 0.182 0.183 0.255 0.033 0.182	Deviati	100 00 R	TC 592 1	I G P I	8	*ge RTC	Table									
0.249 0.456 0.014 0.191 0.649 0.706 0.205 0.523 0.283 0.315 0.212 0.722 0.198 0.209 0.209 0.289 0.578 0.085 0.212 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.265 0.028 0.003 0.015 0.001 -0.023 -0.160 -0.019 -0.184 -0.128 -0.086 -0.175 0.009 -0.003 -0.178 0.45 0.102 0.187 0.001 0.067 0.245 0.198 0.187 0.222 0.132 0.143 0.175 0.213 0.068 0.173 0.725 0.123 0.225 0.021 0.054 0.253 0.183 0.272 0.161 0.173 0.181 0.255 0.033 0.182	31.88	0.015	•		የ	9.22	-0.108	0.194	711.9	٠. ١	0.065	-0.193	•	-0.030	-0.205	9
0.289 0.578 0.085 0.220 0.771 0.821 0.260 0.608 0.359 0.377 0.275 0.838 0.245 0.265 0.265 0.003 0.003 0.003 0.245 0.265 0.003	3	0.249			0	0.649	0.706	0.205	0.523	0.283		0.212	0	0.198	0.209	0.355
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0.102 0.187 0.001 0.067 0.245 0.198 0.137 0.222 0.132 0.143 0.175 0.213 0.068 0.178 0.123 0.226 0.001 0.059 0.178	Vt-314				P	-0.160	610.0-	-0.187	-0.124	-0.128		-0.175	0	-0.033	-0.178	0.075
0.123 0.226 0.001 0.084 0.003 0.253 0.189 0.272 0.161 0.173 0.181 0.255 0.003 0.182	¥t-100	0.102			0	0.245	0.198	0.137	0.222	0.132		0.175	0	0.058	0.178	0.151
	V:-2×5	0.123	0.22	0.001	0	0.333	0.233	0.133	0.272	0.161		0.181	0	0.033	0.182	0.197

TABLE A-3. (Concluded)

Deviation of RIG Bias 0.017 RMS 0.358 WY-Bias 0.530 WY-AAD 0.136 WY-AAD 0.136 WY-ZMS 0.155 Deviation of Ma								. !						Ş	2781244
25 S	of RTC	: 603 I	e fro	a Aver	ARE RIC	Table									
နှံ့ပည် မှု		0.082	53	.040	-0.262	0.005	330	-0.064	.233	-0.075	8	•	-0.018	-0.427	9,101
៖ ១ ស ស ស		0.501	145	.226	0.306	0.000	630	0.504	.239	0.173	47		0.030	0.572	916
៖ ១ ស ស្ត្		0.335	175	.263	0.393	0.113	764	0.604		0.205			0.171	407.0	144
បីស ខ្លុំ		0.143	133	.019	0.223	0.0.0	267	0.047		0.063		•	000	73.5	
KS 0 K f Or		0.225	138	.075	0.223	0.00	234	0.178		0.079		•		476	50.0
et for		0.271	141	960	0.242	0.010	0.363	0.218	0.225	0.098	35	0.071	0.042	0.416	0.225
	of 8a	from A	•	TC Teb	le (RTC	freque	ictes u	sed for	veteht	7					
	0.032	0.130	103	0.058	-0.018	0.062	0.058	Ç				č	-	41.0	0
		0.147	7	0.516	0.029	0.423	0.936	5	750	200	•	٠ د د		•	
		0.185	12	0.600	0.13	0.436	-	. ~		1 1 8 4	٠	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֓֡֓֓֡֓֡		•	75.0
81.48	0.031	0.127	10	0.071	000	810	٠ç	; ;		610	•	? ?		•	
		0.127	103	0.166	00.00	0.126	, C	ŝ			•	20.0	5 -	75.0	20.0
WE-RHS 0.	0.036	0.133		0.210	0.00	0.161	0.423	0.024	0.038	0.476	0.307	0.111	0.270		0.275
	2			;	•									•	
1011	13 L	•	Beatal	=	-										
_	. 960.	0.094 -0.647	0.05	0.241	0.760	0.384	•	•	•	6.537	0.215	o.		•	0.043
	0.749	1.341	704	7	0.760	•	•	•	•	1.125	0.685	ó		•	908.0
	999.0	1.619	.813	₹.	0.813	•	•	•	•	1.333	0.800	ó			1.079
•	0.105	-0.817	.031	~	0.731	•	9.303	907.0	0.269	0.249	0.177	0.079	•	•	0.034
	0.323	0.838	300	~	0.751	•	•	•	•	0.633	0.318	0			0.453
We-EMS 0.	.399	1.012	.355	r.	0.739	•	•	•	0.284	0.758	0.390	0.050	994.0	0.989	0.592
Devietion o	of ME	PS Expe	risental		from Av		Ant Ota	•							
Bi45 0.	. 126	0.126 -0.717	157	0.183	0.747	949.0	6,717	'		\$ 63.0-	101	115	160	-	
3	0.778	1.231	`	0.221	0.744	0 7 9	1.610		0.263	0.575	1.262	0.753	105	607	
RYS O.	0.898	1.472	80	0.275		776	1.857			0.576	94	31.0	1 223	; ;	
8146		-0.683	-	0.174		417	-0.246			27.5	0.739		0.07	3	2
V:-AM 0.		0.739	٠,	0.175		468	0.658			0.574	0.584	4	0.621	7 7	•
	0.428	0.879	0.413	0.189		0.503	0.787	_		0.575	0.709	0.175	0.749	0.48	0.592
Deviation of MEPS Expe	0. Y.D	-	riaental	-	from S.	13e-Por	e-Pors RIC Te	able							
Biss 0.	. 101.		0.327	.252	0.791	535	-0.159	0.2	•	46	0.341	~	0.186	-0.185	0.097
.o.	0.679		1.171		^:	245	0.842	~				. ~	1.406	909-0	0.734
L'S 0.	0.792		1.363	•	~	651	0.978	•0	•	. 56	•		1.623		606.0
V:-Bias O.	0.212		0.324	•		533	-0.213	-		46		. ~	0.125		0.095
Yt-AMD 0.	0.321		0.553	0.260	0.792	0.533	0.359	0.299	0.374	0.455	0.420	0.236	0.573	0.375	0.434
V:-245 0.	.402	0.530	0.663		۲.	548	0.431	~		4.3	•	7	0.700		513

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), 'able 60.

TABLE A-4. Composite-Score Deviation Analyses for Equipercentile Equating Tables

essented respected sections respected residences backtures respected respect

Periation of RTC 138 Table from Average RTC Table Deviation of RTC 138 Table from Average RTC Table Deviation of RTC 138 Table from Average RTC Table Deviation of RTC 138 Table from Average RTC Table Deviation of RTC 250 0.155 0.157 0.150 0.150 0.151 0.153 0.157 1.144 0.011 0.0156 0.155 1.007 1.058 0.158 0.159 0.151 0.159 0.159 0.150 0.				3	ARCL	V 8.53	ARSC	4 3C0	ARFA	AROF	APST	KOX.	MCCO	HCFA	25	Avetage
100 of RTC 138 Table from Average RTC Table 0.180 0.180 0.191 1.014 1.015 1.015 0.115 0.115 0.115 0.115 1.015 0.115 0.115 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.115 1.015 0.11																
0.180 -0.666 0.097 -1.014 1.560 -1.477 -0.999 0.100 -1.528 0.129 -0.317 -1.414 0.011 -0.928 0.245 1.137 1.131 1.	4110	a of RI	C 158 T		5	are RTC										
0.246 1.335 1.135 1.039 1.568 1.360 1.037 1.065 1.538 0.637 1.170 1.506 0.165 1.037 1.064 1.232 1.135 1.135 1.135 1.135 1.035 1.036 0.155 1.135 1.035	_	0.180	-0.606		7	-1.760		-0.993	0.100	47. 47.R	139	נונ נונ	114 1-	•	• 6	
0.355 1.964 1.355 1.755 3.047 3.057 3.157 3.157 3.154 3.154 3.158 3.158 3.159 3.156 3.155 3.155 3.157		0.246	1,335		1.059	1.768	085	610	1 065			0000	***	9 (076.0-	150.0
**O.055 -0.050 -0.106 -0.047 -0.044 0.075 -0.144 0.135 -0.124 0.124 0.124 0.125 0.134 0.125 0.135 0.134 0.125 0.13		0.367	1.964	1.53	127	3 0 6 7	2 2			1.550			900.	> (20.1	1.089
The contraction of the contracti		-0.053	000	401 01				400.4	1.00	* 17.7	20.0	1.230	4.019	•	1.332	1.878
Court Cour		100		91.0		30.0		261.0-	666.0	-0.25	-0.209	-0.343	\$20°0	0	-0.033	9.138
Control of the cont	3 5		771.0	017.0	1/1.0	0000	0.212	0.189	0.366	0.266	0.305	0.367	0.214	0	0.261	0.230
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## Court		0.771	0.5	0.485	ö	1.007		2.249	0.415	2.057	0.689	0.396	2.497	1.170	. 0.338	2.136
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##		1.157	0.0	717			;				1.00.		0110		0.3%	0.930
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10.249 0.549 0.251 0.262 0.515 0.264 0.191 0.302 0.445 0.353 0.215 0.521 0.246 0.198 0.249 0.549 0.251 0.262 0.598 0.387 0.260 0.249 0.549 0.251 0.262 0.598 0.387 0.260 0.249 0.549 0.251 0.262 0.598 0.387 0.260 0.262 0.598 0.387 0.260 0.262 0.262 0.262 0.387 0.260 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.262 0.387 0.383 0.383 0.383 0.383 0.382 0.387 0.382				50.0	671.0-	101.0	; ;		-0.124	-0.214	-0.093		97.	,	0.057	<u>፡</u> ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡ ፡
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10n of RIC 592 Table from Average RIC Table 0.104 -0.107 -0.008 0.183 0.630 0.788 0.103 0.727 0.636 1.025 -0.306 0.206 -0.488 -1.545 0.451 1.238 1.281 0.793 1.254 1.001 1.713 1.011 0.964 1.367 1.156 0.514 0.543 1.703 0.499 1.638 1.708 0.936 1.613 1.415 2.197 1.289 1.192 1.752 1.402 0.733 0.658 2.907 0.499 1.638 1.708 0.936 1.613 1.415 2.197 1.289 1.192 1.752 1.402 0.733 0.658 2.907 0.009 -0.163 -0.093 -0.090 -0.385 -0.096 -0.320 -0.389 -0.340 -0.382 -0.341 -0.015 -0.015 -0.015 -0.015 0.173 0.247 0.330 0.465 0.704 0.244 0.428 0.431 0.429 0.568 0.422 0.233 0.192 0.265 0.211 0.294 0.379 0.540 0.832 0.291 0.474 0.471 0.491 0.613 0.429	3	0.249	0.549	0.251	0.262	0.532	ö		0.425	0.590	0.524		0.598		0.260	0.411
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**************************************		804		200	760					***	100.1	1.150	0.014	0.043	1.703	1.068
# 0.007 -0.163 -0.093 -0.090 -0.383 -0.096 -0.350 -0.359 -0.360 -0.382 -0.341 -0.015 -0.013 -0.263				0000	0.73		C14.1	761.7	1.689	1.192	1.752	1.402	0.733	0.658	2.907	1.551
0-1/3 0.247 0.330 0.465 0.704 0.244 0.428 0.433 0.429 0.568 0.422 0.233 0.192 0.267 0.211 0.294 0.379 0.340 0.832 0.281 0.474 0.471 0.491 0.631 0.479 0.374 0.316 0.44				-0.093	-0.090		96.0	-0.320	0.329	-0.360	0.382	-0.341	9.012	-0.031	-0.263	-0.205
0.211 0.294 0.379 0.340 0.832 0.291 0.474 0.471 0.491 0.631 0.479 0.374 0.316 0.44	3	0.173		0.330	0.465		0.244	0.428	0.433	0.429	0.568	0.422	0.233	0.192	0.267	747
	3	0.211		0.379	0.540	0.832	0.291	0.474	0.471	0.491	0.631	0.470	17.0			

TABLE A-4. (Concluded)

AND SECOND DESCRIPTION OF THE PROPERTY OF THE

from Average RTC Table 1.003	Deviation Bias AAD	0.172 0.791	603	7300	ARC F	Ş	AKSC	YK CO	ASS.	AROP.	ARSI	HCA HCA	HCCO	HCFA	ES.	Average
Construction of RIC 601 Table from Average RIC Table	Deviatio Blas AAD RYS	0.172 0.172 0.791	603													
0.177 1.1599 1.1223 1.401 2.261 1.625 1.0004 1.070 1.411 0.991 0.230 1.1597 0.1192 0.130 1.0102 1.1571 1.1599 1.1523 1.1502 2.261 1.625 1.1571 1.1599 1.1523 1.1502 2.261 1.625 1.1571 1.1502 1.151 1.1502 2.262 0.251 1.1522 1.1522 2.0502 2.0502 2.0502 0.459 0.	81.88 AAD RYS	0.172	1.599		4											
0.731 1622 1723 1538 2.637 1.634 1.704 1.411 0.931 0.931 0.1393 0.132 0.1393 0.132 0.1393 0.731 1.006 2.213 1.232 2.232 2.232 2.202 2.202 2.135 0.232 0.134 0.132 0.232 0.233 0.233 0.232 0.233		0.791		•	200	שנע ער יייי										
1016 2.212 1.774 2.026 2.014 1.027 2.992 2.006 2.156 2.508 0.902 2.115 0.059 1.001 1.001 0.215 0.215 1.774 2.018 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 1.001 0.015 0.015 0.015 0.019 0.010 0		16/10		? ;	•	9	1.55/		•	•	•	っ	•	.13	٠:	1.100
1010 2.215 0.2214 2.0214 4.0219 2.227 2.2050 2.105 0.505 0.902 2.105 0.0215 0.2				?	•	٥.			•	۲.	•	9	•	ò		1.674
		910.1		7.	ö	o.			•	~	•	٥.	•	ő		71.6
0.273 0.195 0.273 0.243 0.527 0.258 0.66 0.491 0.589 0.490 0.470 0.470 0.107 0.104 0.456 0.198 0.542 0.768 0.454 0.716 0.455 0.558 0.505 0.566 0.194 0.451 0.456 0.198 0.542 0.768 0.454 0.716 0.455 0.598 0.505 0.566 0.194 0.451 0.452 0.708 0.452 0.708 0.454 0.006 0.009 0.601 1.002 1.611 1.009 1.199 0.823 1.452 1.035 0.935 0.196 0.432 0.146 0.195 0.195 0.195 0.1009 0.107 0.148 0.011 0.009 1.190 0.823 1.199 0.195 0.195 0.195 0.195 0.106 0.195 0.106 0.107 0.148 0.011 0.192 0.192 0.192 0.193 0.195 0.106 0.107 0.148 0.011 0.192 0.192 0.192 0.193 0.195 0.106 0.109 0.107 0.148 0.011 0.192 0.192 0.192 0.193 0.193 0.193 0.196 0.100 0.103 0.106 0.107 0.148 0.011 0.192 0.192 0.193 0.193 0.194 0.195 0.195 0.105	•	-0.075		.23	∹	ŗ				٦.	•	٠,	•	č	: -	
0.310 0.456 0.388 0.342 0.768 0.434 0.736 0.539 0.637 0.538 0.505 0.566 0.134 0.456 0.319 0.456 0.319 0.456 0.319 0.456 0.319 0.451 0.029 0.432 0.035 0.505 0.566 0.134 0.481 0.029 0.312 0.238 0.035 0.435 0.036 0.396 0.396 0.482 0.235 0.039 0.401 0.031 0.101 0.391 0.392 0.343 0.393 1.305 0.343 0.318 0.328 1.393 0.832 1.396 1.346 0.231 1.305 0.107 0.148 0.031 0.322 0.231 0.238 0.035 0.107 0.148 0.031 0.322 0.231 0.258 0.035 0.107 0.148 0.031 0.232 0.243 0.135 0.236 0.235 0.103 0.230 0.107 0.138 0.230 0.230 0.230 0.237 0.243 0.135 0.236 0.235 0.442 0.337 0.230 0.237 0.237 0.243 0.135 0.236 0.235 0.135 0.236 0.235 0.137 0.443 0.245 0.135 0.236 0.235 0.137 0.440 0.337 0.430 0.440 0.337 0.230 0.230 0.337 0.430 0.440 0.337 0.430 0.243 0.135 0.236 0.336 0.344 0.235 0.238 0.236 0.336 0.344 0.329 0.237 0.337 0.441 0.239 0.231 0.441 0.239 0.231 0.442 0.337 0.442 0.337 0.444 0.230 0.031 0.444 0.230 0.031 0.444 0.230 0.031 0.444 0.230 0.031 0.444 0.230 0.444 0.230 0.444 0.230 0.444 0.230 0.444 0.230 0.444 0.230 0.444 0.230 0.444 0.240 0.344 0.444 0.240 0.344 0.444 0.240 0.444 0.240 0.444 0.344 0.444		0.273		.27	٠.	9				~	•	١ ٩	•	; -	: 1	
10.0 of Ba from Average RIC Table (RIC frequencies used for weights) -0.219 -0.942 -0.841 -0.772 -0.972 -0.558 -0.035 -0.925 -0.086 -0.396 -0.492 -0.295 -0.080 1.030 1.118 1.009 1.119 0.829 1.186 1.231 1.009 1.119 0.829 1.186 1.231 1.009 0.107 0.148 0.031 1.386 1.523 1.239 1.239 0.135 1.536 1.046 1.231 1.130 0.107 0.148 0.032 1.399 1.386 1.539 0.135 0.042 0.045 0.204 0.107 0.148 0.032 0.137 0.437 0.445 0.136 0.205 0.204 0.103 0.107 0.130 0.107 0.130 0.042 0.130 0.107 0.130 0.107 0.130 0.107 0.130 0.020 0.137 0.130 0.107 0.130 0.107 0.130 0.107 0.130 0.107 0.130 0.130 0.107 0.130 0.130 0.130 0.130 0.130 0.130 0.130 0.130 0.130 0.130 0.140 0.130 0.130 0.140 0.130 0.130 0.140 0.130 0.130 0.140 0.180 0.130 0.107 0.130 0.130 0.130 0.140 0.180 0.130 0.130 0.140 0.180 0.		0.110		.38	'n					٠.		. ~	• •	2 -		2.5
ton of & from Average NTC Table (NTC frequencies used for weights) -0.219 -0.942 -0.0841 -0.712 -0.922 -0.208 -0.008 -0.405 -0.995 -0.												•	•	:		
-0.239 -0.942 -0.841 -0.772 -0.972 -0.528 -0.086 -0.435 -0.955 -0.086 -0.396 -0.492 -0.256 -0.086 -0.396 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.086 -0.395 -0.317 -0.317 -0.497 -0.497 -0.495 -0.315 -0.306 -0	Deviseic	30 of 81	from	verage	2	·	freque	cles u	led f	velaht	7				•	
0.601 1.302 1.811 1.009 1.139 0.829 1.167 2.432 1.016 0.737 0.699 1.146 0.1201 0.694 2.178 2.733 1.528 1.599 1.386 1.552 3.298 1.239 0.832 1.336 1.66 1.221 1.000 0.107 0.148 0.013 0.138 1.528 1.599 1.386 1.552 3.298 1.239 0.832 1.336 0.165 0.150 0.105	8143	-0.239	-0.942	.841	-	-0.972	-0.528	0.086	9	0.975	٠c	č	4	·		
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Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 61.

APPENDIX B: OPLAN, CALIBRATION STUDY FOR ASVAB FORMS 11/12/13, 15 OCTOBER 1982

DEPARTMENT OF DEFENSE



CANDOLARIERS UNITED STATES MILITARY ENTRANCE PROLESSINI, CUMMA 2900 GREEN BAY ROAD

2500 GREEN BAY ROAD NORTH CHICAGO ILLINOIS 60064

REPLY TO

MEPCT-P

1 5 OCT 1382

SUBJECT: 10 January 1983 Calibration Study for the Armed Services

Vocational Aptitude Battery (ASVAB), Forms 11, 12, and 13

Commander, Eastern US Military Enlistment Processing Command Commander, Central US Military Enlistment Processing Command Commander, Western US Military Enlistment Processing Command

- 1. As previously announced by letter, MEPCT-P, HQ MEPCOM, 30 August 1982, SAB, the US Military Enlistment Processing Command will conduct a calibration study for new ASVAB Forms 11, 12, and 13 beginning 10 January 1983. This letter transmits the Operations Plan for the study (Inclosure 1).
- 2. It is imperative that this study be carried out precisely as planned. Errors in the calibration of a production test are particularly bad because they affect the score of every individual tested during the life of the test. Such errors have the effect of making small but capricious changes in the standards of the services and service training programs which use the test. This is the only study which will be conducted on applicants before the test batteries are implemented on 1 October 1983. Errors will be minimized only by rigorous adherence to prescribed procedures and aggressive identification and resolution of unanticipated problems.
- 3. Recruiting service commanders have been informed of potential processing impacts and have been provided a copy of the Operations Plan and this letter of transmittal.

FOR THE COMMANDER:

1 Incl

J. A. WHITE Colonel, USA

Deputy Commander/Chief of Staff

CF:

CO, ea MEPS

Cdr, HQ USAREC, ATTN: USARCRO-E

Cdr. Navy Rctg Comd. ATTN: 20

Cdr. USAF Rotg Svc. ATTN: RSXM

Comdt, USCG, ATTN: G-PMR-5/62

Comdt, USMC, ATTN: MRRE

Comdt. USMC, ATTN: MP1-20

Mr. Dick Wood, OPM, Washington, DC

Cdr. Air Force Human Resources Laboratory, ATTN: Dr. Rce

Cdr. Air Force Manpower and Personnel Center, ATTN: MPCYPT/Maj Welsh

SUBJECT: Operations Plan (OPLAN) for January 1983 Calibration of Forms 11, 12 and 13 of the Armed Services Vocational Aptitude Battery (ASVAB)

1. SITUATION.

- a. An ASVAB calibration study has been agreed to by the ASVAB Steering Committee and the Commander of the US Military Enlistment Processing Command (MEPCOM). The study is designed to calibrate ASVAB composite scores against the 1980 Youth Population.
- b. The study will be conducted at all of the Military Entrance Processing Stations (MEPS) (including all of the associated Mobile Examining Team (MET) sites), except Anchorage, Butte, Fargo, Guam, San Juan, and Sioux Falls in order to assure a proper sample. It will commence on 10 January 1983. The study will last until the required sample size of 63,000 applicants is obtained (about 4 weeks). Sampling requirements are given at annex A.
- 2. MISSION. To conduct a calibration study of new versions of the ASVAB by administering experimental test booklets to applicants.

3. RESPONSIBILITIES.

a. HQ MEPCOM:

- (1) Designate a project manager at HQ MEPCOM (Dr. Lehnus, MEPCT-P, AUTOVON 459-2881/3373; alternate point of contact: CDR Young, same location).
- (2) Provide contractor and contracting office technical representative (Capt Massey, USAF, Air Force Human Resources Laboratory (AFHRL), AUTOVON 240-3256; alternate point of contact: Dr. Malcolm Ree, same location) a list of the number of experimental test booklets, experimental test administrative manuals, experimental answer sheets, and required sample size required for each MEPS. (Those requirements are listed at annex A.)
- (3) Inform the Director of Office of Personnel Management (OPM) of the calibration study and arrange for additional testing.
 - (4) Prepare and distribute an OPLAN for this study to sectors/MEPS.
- (5) Ensure that the contractor's administrative manuals are compatable with MEPCOM's operational requirements and meet MEPCOM's administrative and testing standards.
- (6) Notify AFFRL of problem situations or shortfall conditions NLT 1 orking day after detection.

b. AFHRL:

The control of the co

- (1) Provide the contractor with instructions necessary to produce the test booklets and test administrative manuals for the calibration study.
- (2) Provide the contractor with experimental answer sheets to be used for the calibration study.
- (3) Receive from the MEPS, visually scan, and inventory completed experimental answer sheets.
- (4) Inform MEPCOM of deficiencies of experimental answer sheets received; request an extension of such testing as may be required to compensate for any deficiencies.
- (5) Optically scan experimental answer sheets and prepare for the contractor a magnetic tape with item response data; ship tape to contractor.
- (6) Safeguard experimental answer sheets for 6 months from date of testing, then destroy.
 - c. Contractor (Assessment Systems Corporation):
- (1) Produce test booklets and test administrative manuals to be used in the calibration study.
- (2) Accommodate MEPCOM quality control procedures by supplying MEPCOM with copies of test booklets and test administrative manuals prior to printing.
 - (3) Receive and inventory answer sheets from AFHRL.
- (4) Package for direct distribution to the MEPS test booklets, test administrative manuals, and answer sheets in accordance with guidance supplied by MEPCOM (annex D).
 - (5) Accommodate MEPCOM quality control of packaging prior to shipping.
- (6) Ship all test materials to arrive at the MEPS no later than 1 December 1982.
- (7) Provide AFHRL with blank magnetic tapes for recording of item response data.
- (8) Receive from AFHRL item response data on magnetic tape and provide analysis as specified in contract.
 - d. MEPCOM sector commanders (see annex B for summary):
- (1) Report to the project manager (Dr. Lehnus, AUTOVON 459-2881/3373) the status of receipt of test materials at the MEPS NLT 13 December 1982. Report to the project manager the status of MET site receipt of testing materials NLT 20 December 1982.

- (2) Coordinate implementation of the calibration study with OPM regions to assure implementation as specified in the execution plan below. This includes providing all clarifying administrative instructions.
- (3) Report to the project manager the dates when MEPS (1) implement, (2) complete the study, and (3) the weekly status of MEPS testing.
- (4) Monitor the calibration study and coordinate information/problem areas between MEPS and HQ MEPCOM, ATTN: MEPCT-P.

e. MEPS commanders (see annex B for summary):

- (1) Ensure receipt and distribution of experimental materials, as necessary, within specified time limits.
- (2) Monitor the study and coordinate information/problem areas between MEPS and sector headquarters. Direct contact with the contractor or AFHRL is not authorized without HQ MEPCOM's approval.
- (3) Coordinate with local OPM officials/examiners to insure receipt and implementation of calibration study booklets in accordance with the contractor's and this OPLAN's instructions.
- (4) Coordinate with Interservice Recruitment Committee (IRC) officials concerning the resulting two-test, 5-hour schedule and the revised testing schedules that may result.
- (5) Administer test booklets/materials IAW the the contractor's instructions; ship experimental answer sheets to AFHRL. Test administrators (TAs) and Chief, Testing Management Sections (CTMS) must be thoroughly familiar with this OPLAN and strictly adhere to proper administration and handling procedures; otherwise, individual MEPS testing requirements will be increased to replace unprocessable samples.
- (6) Report receipt of materials, distribution of materials to METs, start date, weekly testing totals, and finish dates of the study to sector headquarters.

4. EXECUTION. MEPS:

- a. Review OPLAN and prepare for implementation to include coordinating with OPM officials/examiners and planning the distribution of various types of test booklets (see paragraph 4r.).
- b. All calibration study testing will be reported as a special test ("11, 12, 13 calibration study") on the Testing Program Report, indicating who administered the exam (OPM or military).

- c. total coordination will be conducted with the recruiting services and OPM IAs to adjust current test schedules to provide for the additional time required to administer the experimental test (approximately 1 1/2 hours). Some adjustment will have to be made to develop test schedules which allow the time for experimental testing during the calibration study. In addition, each MEPS commander must inform the IRC representatives of this study, so that the message may be passed on to recruiters at the working level. (Recruiting commanders have been informed by letter.)
- d. Every effort should be made to continue 1-day complete processing and/or shipment; however, proper test administration will take precedence over 1-day shipping and it is understood that this will not always be possible due to the constraints of this study.
- e. When two OPM MET sessions are concurrently scheduled on the same day by the same test administrator, the second ASVAB test session will be cancelled when necessary, in advance, so that the experimental test can be administered.
- f. When a MET tester is scheduled for an institutional test and a production test on the same day, the institutional test will take precedence unless the school can be rescheduled. The production test scheduled for that particular day may have to be cancelled or rescheduled.
- g. The Chief, Testing Management Section (CTMS) will visit as many MET sites as feasible immediately prior to or during the calibration study to assure experimental testing procedures are understood and followed and to assure that TAs appreciate the importance of the study*. This activity has been specifically recommended by the Defense Advisory Committee on Military Personnel Testing, a blue-ribbon panel of testing experts whose congressional mandate is to insure the quality of personnel testing in the military. The CTMS will keep a record of visits made. Any observations which might contribute to our understanding of how to conduct calibration studies (e.g. misunderstood instructions or circumstances which make it difficult to follow prescribed instructions) should be written up and transmitted to the sectors NLT 72 hours after the visit. Sectors will transmit these observations to the project manager.
- h. The Informed Consent Announcement form at annex C must be read to all applicants at the start of each test session.
- i. A break should be given between experimental testing and ASVAB testing. Normally, this will be a 10-minute restroom break. A lunch break of up to an hour may be allowed if time and conditions permit. Under no circumstances will the testing extend overnight.

^{*}Errors in the calibration of a production test are particularly bad because they affect the score of every individual tested during the life of the test. Such errors have the effect of making small but capricious changes in the standards of every service and training program which use the test. These errors will be minimized only by rigorous adherence to prescribed procedures by ALL TAS.

- J. Every individual who tests or retests during the calibration study must couplete the experimental test along with his/her production test. If any applicant tails to complete the experimental test, the ASYAB will be invalid. If, under unusual circumstances, the MEPS commander deems it appropriate, the applicant may be authorized an immediate retest under the provisions of paragraph. Is to MEPCOM Regulation 611-1, Enlistment Qualification Tests, 23 September 1982. The retesting, however, must also include the experimental test.
- k. Verification testing of applicants will be done without additional experimental testing. The experimental test will be given only with the full ASVAB 9 or 10.
- 1. Sectors must be notified NLT 17 December 1982 to confirm that all necessary materials have been received, completely distributed, and in the hands of all testers by that date. Sectors will, in turn, notify the MEPCOM program manager of any shortfalls and status of distribution NLT 20 December 1982.
- m. Inventory, store, and ship all experimental booklets and other related items as controlled material in accordance with MEPCOM Regulation 611-1. Forms 2988 and 2989 and associated procedures should be used to control experimental test booklets. Check the totals of each item received against the quantities described in annex A. Direct distribution to area QPM examiners by MEPS has been authorized by OPM for the purpose of this calibration study. If problems are incurred with direct distribution to OPM examiners, notify OPM area offices and sector headquarters immediately.
- n. Each MEPS will receive from the contractor a supply of calibration test booklets, lest administration manuals, and answer sheets. There will be nine different types of test booklets; each type of booklet contains a different combination of ASVAB subtests. The booklet type is printed on the cover of the booklet (1 through 9). For each type of booklet, there are two forms (A and B). The form is also printed on the cover of the booklet.
- o. Corresonding to the nine types of calibration test booklets, there are nine types of test administration manuals. The numbering in the administrative manuals corresponds to that on the test booklets. It is imperative that all calibration test booklets used in a test session be of the same type as the administrative manual used in that session! The IA should check at the beginning of each session to assure that all test booklets are of the same type as the administrative manual. The answer sheet provided by the contractor will be used for all testing with booklets numbered 1 through 9.
- p. The calibration test booklets will be reused for the duration of the study. After each test session, the TA should follow normal procedures to assure the booklets are not marked or defaced in any way.

- q. All testing sites associated with each MEPS will conduct calibration testing, until that MEPS has met the quotas specified in annex A. The MEPS must meet or exceed the sample requirements for <u>each</u> of the nine booklet types.
- r. The MEPS will determine the distribution of testing materials to the MET sites which is required to meet the sample requirements. It is suggested that each MET site receive only one type of calibration test booklet and the corresponding test administration manual, provided this will allow the MEPS to meet its quota for each type of test booklet. For each type of test booklet sent to any testing site, an equal number of versions A and B will be provided. The total number of booklets sent to each testing site should be based on the maximum number of applicants anticipated in a single test session.
- s. MEPS should administer each type of test booklet on a rotating basis (i.e., administer type 1 on Monday, type 2 on Tuesday, etc.). This rotating schedule of test types may be adjusted to achieve the prescribed quota for each test type for the MEPS.
- t. In each test session, an approximately equal number of calibration Forms A and B will be administered. Normal procedures will be followed to assure applicants sitting next to one another receive different forms.
- u. In all test sessions, the calibration booklet will be administered before the production ASVAB. The production ASVAB will be administered following normal testing procedures. Data from the production ASVAB will not be used for calibration purposes in this study.
- v. The volume of material that must be processed following a study of this magnitude dictates that the following special handling instructions be followed precisely. Failure to follow these instructions will cause the data to be lost. In particular, sets of answer sheets which do not have identical social security numbers cannot be processed by AFHRL.
- (1) Ensure that all personal data are clearly encoded and completely filled in with pencil, not pen, on the calibration answer sheets. Social security numbers must be encoded on each answer sheet, and all answer on ets for an individual applicant must have the identical social security number.
- (2) Ensure that responses are properly gridded (i.e., no circling of answers) and filled in with pencil, not pen.
- w. At the end of each week, the MEPS will report to the sectors the total number of applicants who have taken each of the experimental booklets.

x. All experimental answer sheets will be sent to AFHRL in a <u>single</u> shipment after the MEPS has completed all assigned sampling. When a MLPS has completed its quotas, the MEPS will send (1) the completed experimental answer sheets, and (2) a name roster of applicants tested to AFHRL for scoring (copies of MEPCOM Form 603 will suffice and reproduction is authorized). A cover letter identifying the MEPS must be included inside each shipping container. All materials will be shipped by registered mail to:

· Commander
Air Force Human Resources Laboratory
ATTN: MOAM/Roy Chollman
Brooks AFB, TX 78235

y. When a MEPS has completed all assigned sampling the remaining testing materials are to be forwarded from MET sites to the MEPS and held temporarily. HQ MEPCOM will confirm that each MEPS has forwarded to AFHRL sufficient useable answer sheets to meet sampling requirements, and so inform the sectors. Upon notification by the sectors that further testing is not required, the MEFS/CTMS will be instructed to destroy all experimental test materials.

ANNEX A

(Sample and Test Material Requirements for MEPS,
Eastern MEPCOM for Jan 83 Calibration, ASVAB 11, 12, & 13)
to Jan 83 Calibration, ASVAB 11, 12, & 13.

	Number of Sets* Test Booklets	Number of Sets** Admin Manuals	Number of Answer .Sheets	Sample Size Each Booklet	Total Sample Size
MEPS		•	000	C.F.	tor
Albany, NY	20	3	920	65	585
Atlanta, GA	78	5 '	1,975	165	1,485
Baltimore, MD	85	5 · 5 3	2,760	240	2,160
Beckley, WV	31		710	. 45	405
Boston, MA -	58	4	2,025	170	1,530
Buffalo, NY	72	4	1,400	110	9 90
Charlotte, NC	40	5	1,400	110	990
Ft Jackson, SC	63	4	1,800	150	1,350
Harrisburg, PA	37	4	975	70	630
Jacksonville, FL	27	4	1,535	120	1,080
Manchester, NH	24	4	76 5	50	450
Miami, FL	42	3	1,150	120	1,080
New Haven, CT	23	3 3	820	55	4 95
New York, NY	29	4	3,280	· 290	2,610
Newark, NJ	65	4	1,975	165	1,485
Philadelphia, PA	62	4	2,235	190	1,710
Pittsburgh, PA	54	4	1,700	140	1,260
Portland, ME	26	4	870	60	540
Raleigh, NC	63	5	1,600	130	1,170
Richmond, VA .	29	4	1,760	145	1,305
Springfield, MA	16	3	870	60	540
Syracuse, NY	44	3	1,130	85	765
Tampa, FL	17	3 3 2	1,150	90	810
Wilkes-Barre, PA	20	4	975	70	630
milkes-parie, in	1,025	92	35,780		26,055

^{*}A set of test booklets consists of 18 booklets: I of each form (A or B) for each type (1 through 9).

^{**}A set of administrative manuals consists of 9 booklets: 1 of each type (1 through 9).

ANNEX A

(Sample and Test Material Requirements for MEPS,
Central MEPCOM for Jan 83 Calibration, ASVAB 11, 12, & 13)
to Jan 83 Calibration, ASVAB 11, 12, & 13

	Number of Sets* Test Booklets	Number of Sets** Admin Manuals	Number of Answer Sheets	Sample Size Each Booklet	Total Sample Size
MEPS			2 200	005	2 565
Chicago, IL	99	5	3,200	285	2,565
Cincinnati, OH .	36	3	1,500	120	1,080
Cleveland, OH	46	4	2,130	180	1,620
Columbus, OH	37	· 4	1,400	110	990
Des Moines, IA	83	3	1,180	90	810
Detroit, MI	31	5	3,230	285	2,565
Indianapolis, IN	61	3 5 6 3	1,450	115	1,035
Jackson, MS	. 28	3	800	65	585
Kansas City, 140	36	4	1,550	125	1,125
Knoxville, TN	21	4	975	70	630
Little Rock, AR	37	3	975	70	630
Louisville, KY	38	3 4	1,240	95	855
Memphis, TN	47	4	1,190	90	810
Milwaukee, WI	47	5	1,700	140	1,260
Minneapolis, MN	40	4	1,600	130	1,170
Montgomery, AL	43		1,900	160	1,440
Nashville, TN	24	3	1,080	80	720
New Orleans, LA	25	3	1,190	90	810
Omaha, NE	าั้ง '	3	820	55	495
Shreveport, LA	20	5 3 3 3	765	50	450
St Louis, 140	51	5	5,500	170	1,530
JE 20013, 110	868	<u>8</u>3	35,375	2,575	23, 175

^{*}A set of test booklets consists of 18 booklets: 1 of each form (A or B) for each type (1 through 9).

^{**}A set of administrative manuals consists of 9 booklets: l of each type (1 through 9).

ANNEX B SEQUENCE OF ACTION to Jan 83 Calibration, ASVAB 11, 12, 13 Study

AT DESIGNATED MEPS & MET SITES

SECTOR COMMANDS

15 Oct - 1 Dec

MEPS review OPLAN and plan the distribution and scheduling of experimental test booklets to assure different types are completed in same time frame.

Coordinate implementation with OPM regions.

1 Dec - 10 Dec

MEPS receive/inventory experimental test materials and distribute to 09% representatives. Log and check materials received against annex A of 0PLAM.
MEPS notify sectors of status when materials have been inventoried.

Notify MEPCT-P of any discrepancies in shipment to to MEPS.

NLT 13 Dec

NLT 20 Dec

45

MEPS distribute experimental test materials to MET and OPM test sites must be complete.

of test materials at MEPS.

Confirm completed MEPS/METS
distribution with MEPCT-P.

Notify MEPCT of status of receipt

10 Jan to completion

1. Begin administering experimental tests. Report start date to sector.

Report MEPS starting/weekly status to MEPCI-P.

2. Report results to sector on a weekly basis.

3. Stop experimental testing when all quotas have been met. Report to sector. Ship all answer sheets to AFHRL/MOAM. Collect, inventory and secure all experimental test materials from the MET and OPM test sites.

4. On instructions from sectors, destroy all experimental test materials.

Transmit "destroy" instructions. to MEPS. Confirm destruction.

ANNEX C INFORMED CONSENT ANNOUNCEMENT FOR CALIBRATION STUDY to January 83 Calibration, ASVAB 11, 12, & 13

Announce prior to handing out materials:

WE WILL BE ADMINISTERING TWO SETS OF TESTS TO YOU TODAY. THE TESTING WILL REQUIRE ABOUT FIVE HOURS OF YOUR TIME. BOTH TESTS ARE IMPORTANT AND NECESSARY FOR YOU TO APPLY FOR THE ARMED SERVICES AT THIS TIME. IF YOU HAVE A QUESTION, RAISE YOUR HAND. (PAUSE AND ANSWER QUESTIONS). IF YOU ARE NOT ABLE TO TEST FOR THE FULL SESSION, FOR ANY REASON, PLEASE INDICATE THIS BY RAISING YOUR HAND.

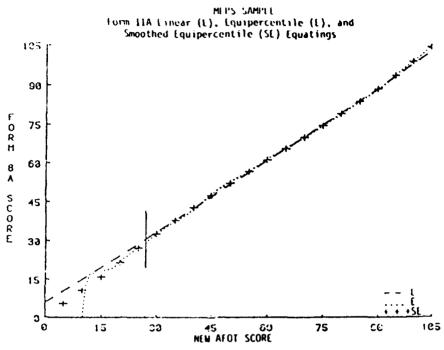
(Pause and release any one who wishes to leave.)
(Hand out materials after this point.)

ANNEX D REQUIREMENTS FOR SHIPPING TEST MATERIALS TO MEPS for JAN 83 Calibration Study of 11, 12, & 13

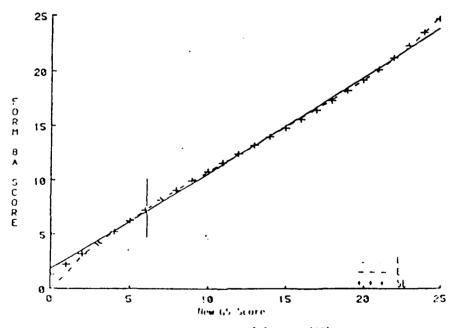
- 1. All testing materials (test booklets, test administrative manuals, and answer sheets must be shipped by first class, registered mail.
- 2. All testing materials must double wrapped. That is, materials must be wrapped in heavy paper and placed in cardboard boxes. The package must be able to withstand rough treatment without bursting.
- 3. Each package within the box must be labeled:
- (a) "Controlled Test Materials: To be opened by Test Control Officer Only."
 - (b) "Store in a secure area only."
- 4. Each box must contain:
- (a) A mailing label inside the paper wrap which is identical to the outside mailing label.
- (b) A notice on top of materials inside the box which says "If found, open, reseal and notify MEPCOM (312) 926-2881."
 - (c) A shipping list which:
- (1) Lists all test booklets by identifying numbers (e.g., "50 test booklets, #00351 through #00460").
- (2) List all test administrative manuals and answer sheets by count (e.g. 5 sets of test administrative manuals; 200 answer sheets).

APPENDIX C: EQUATING GRAPHS

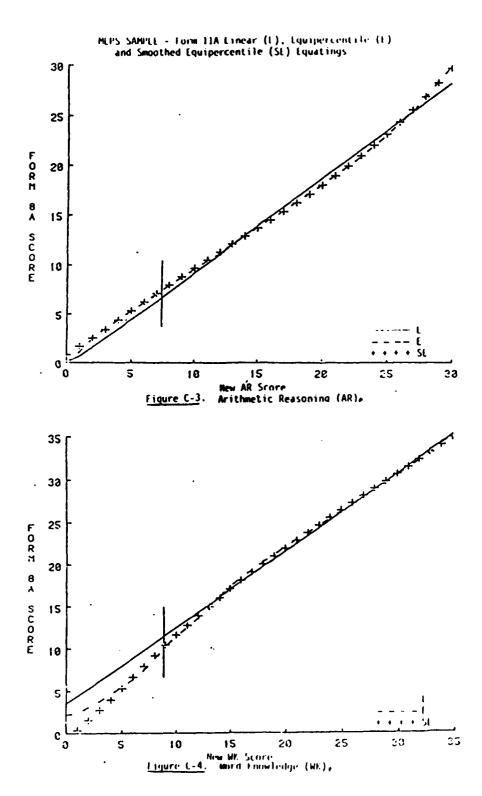
Note: Figures C-1 through C-12 show the equating comparisons for ASVAB lla subtests and raw score composites based on the MEPS data. Figures C-13 through C-24 show equating comparisons for ASVAB l2a subtests and raw score composites based on the RTC data. Tables C-25 through C-36 compare equatings in MEPS and RTCs using ASVAB version lla.



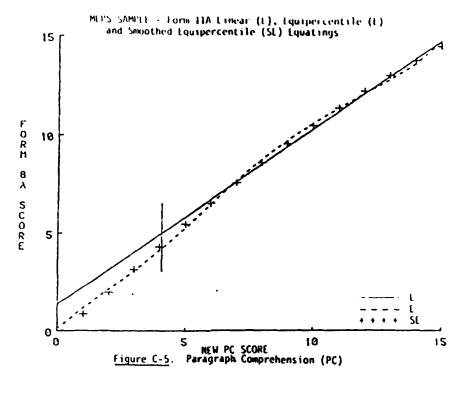
<u>Figure C-1</u>. Armed Forces Qualification Test (AFQT).

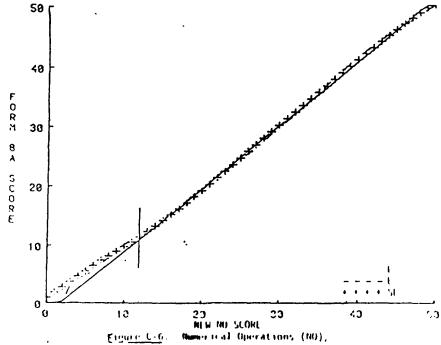


<u>figure G-2</u>. General Science (GS).

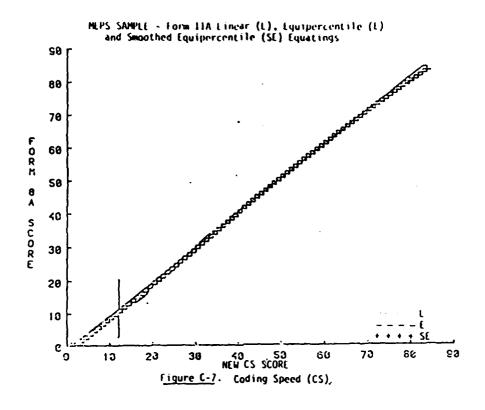


STATE SELECTION SECURITION

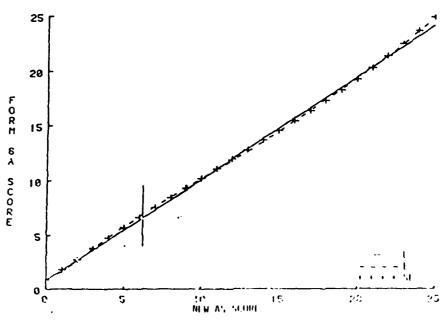




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Liquity C.B. Auto and Shop Information (7%).

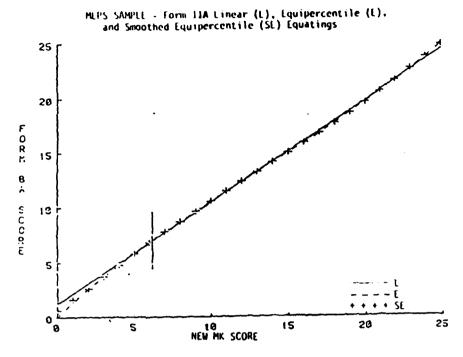
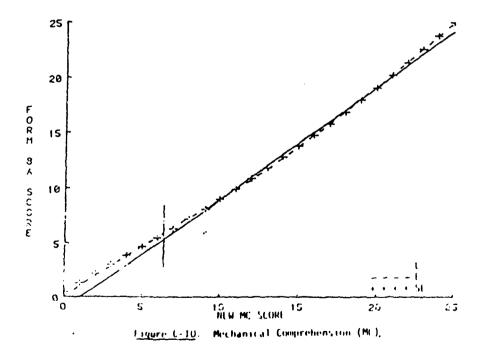
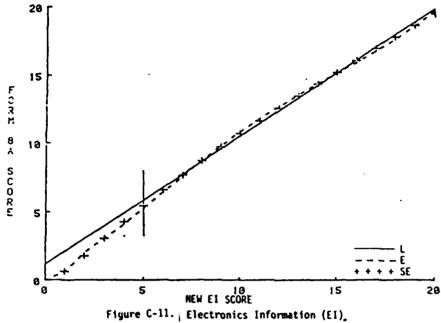


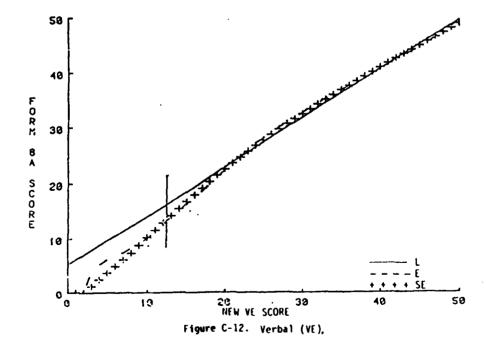
Figure C-9. Mathematics Knowledge (MK).

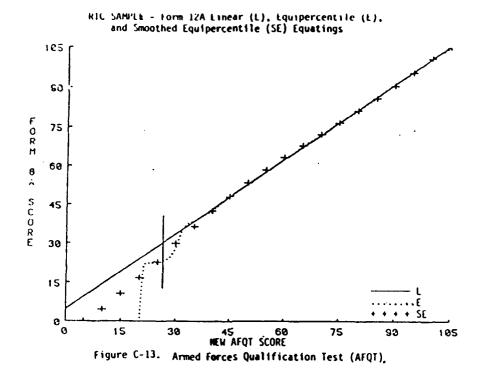


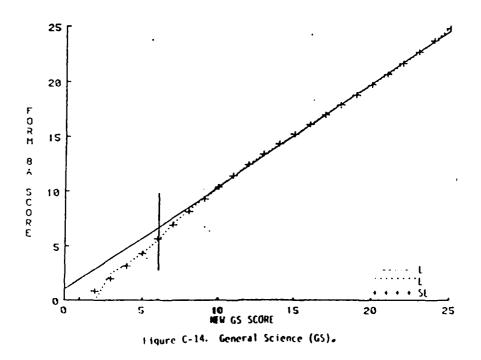
MEPS SAMPLE - Form 11A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

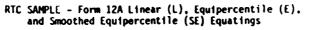


rigure o see | Electronics information (E1),









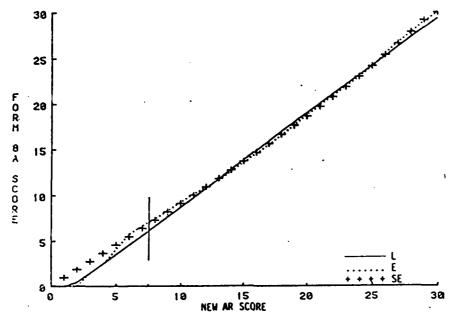
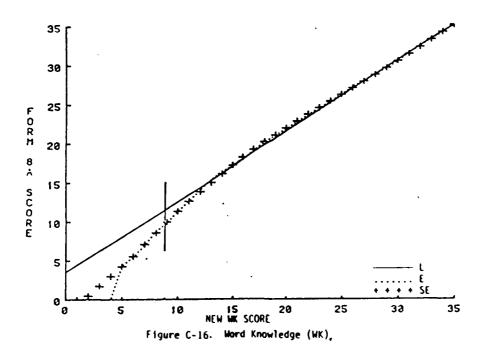
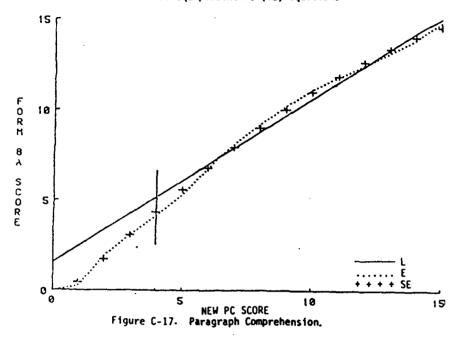
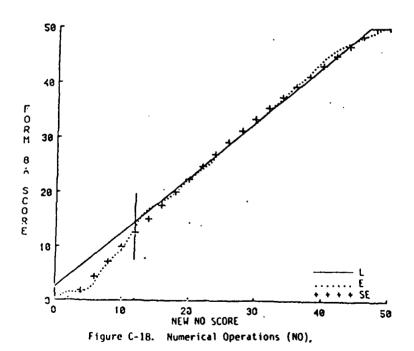


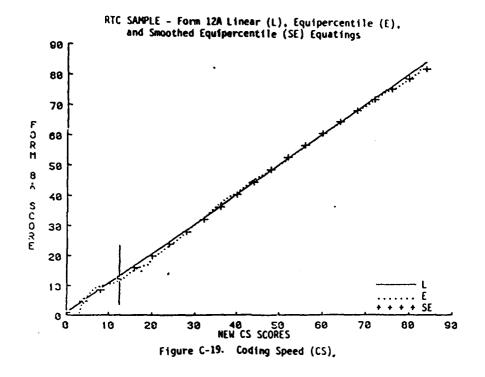
Figure C-15-: Arithmetic Reasoning (AR),

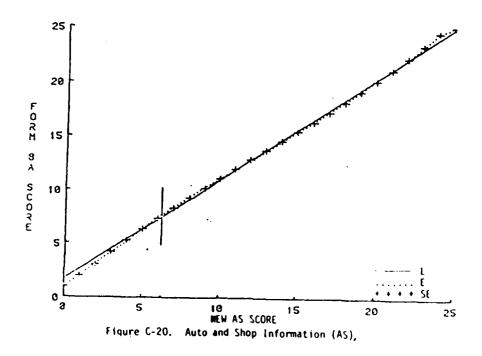


RTC SAMPLE - form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equations

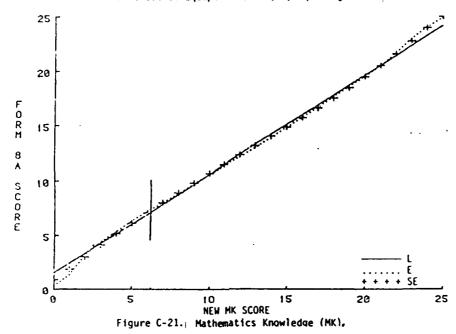


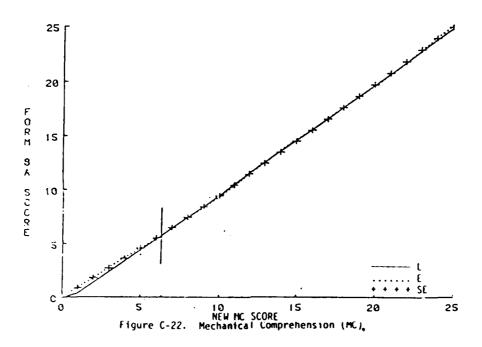


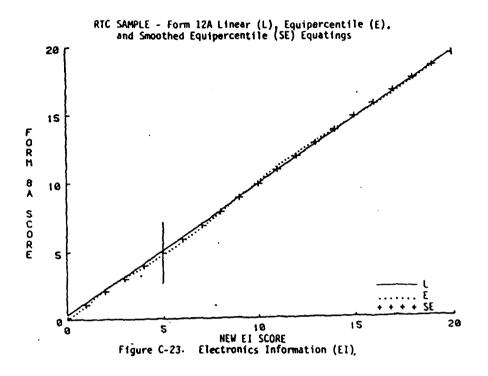


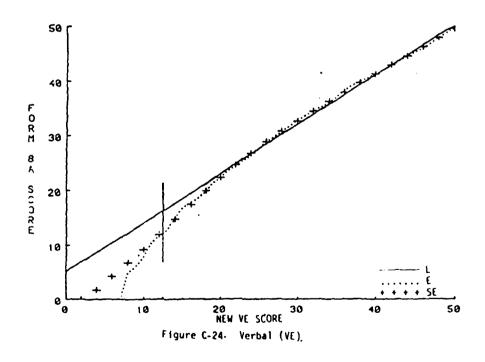


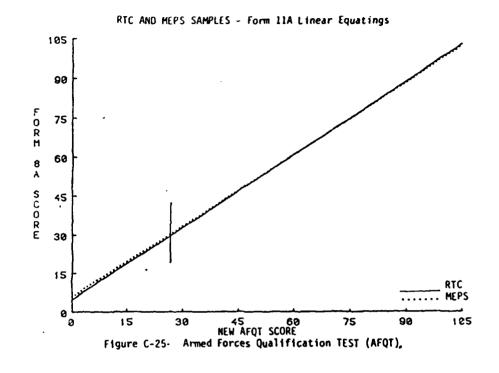
RTC SAMPLE - Form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

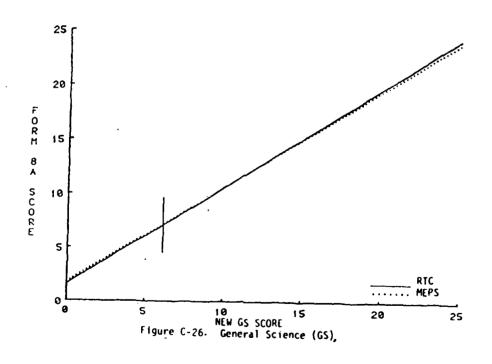


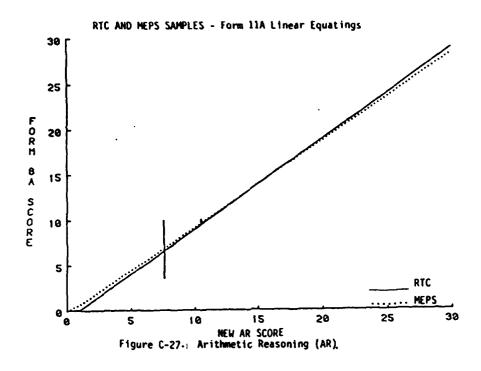


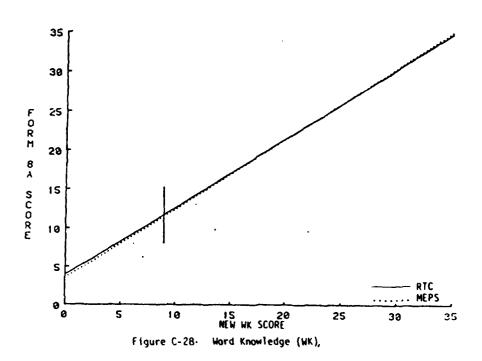


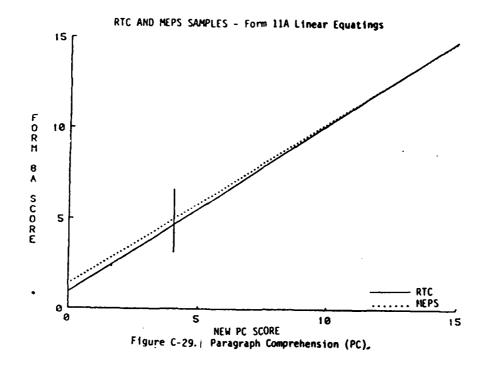


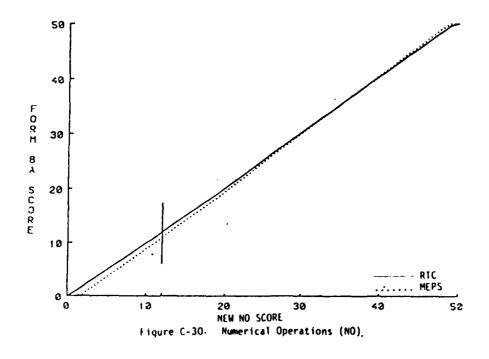




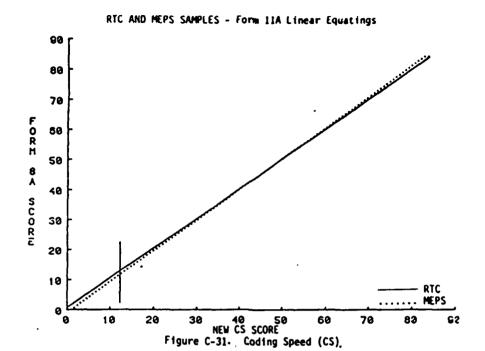


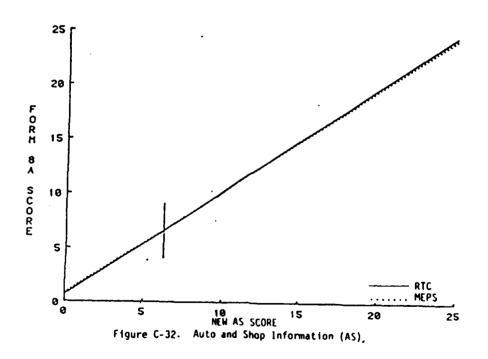


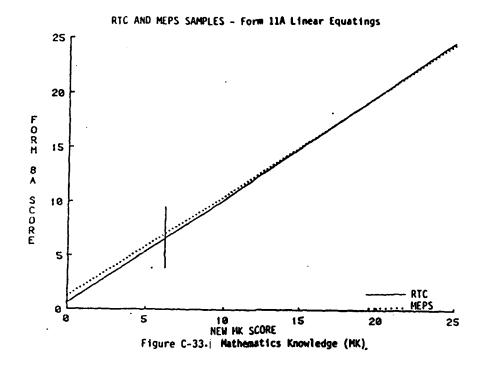


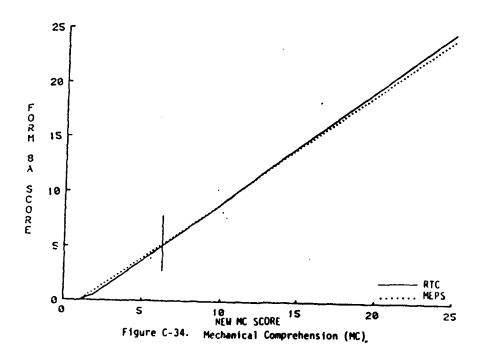


na ladytotyki baskkatyki branadyk szazcze radowane sassania kakeata

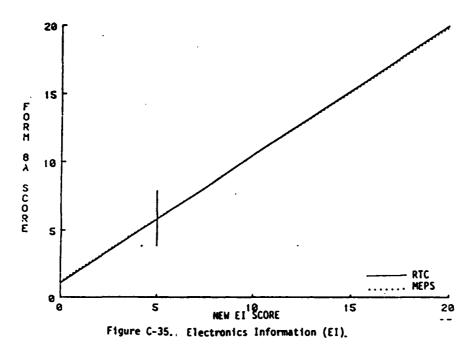








RTC AND MEPS SAMPLES - Form 11A Linear Equatings



FOR 30 8 A S 20 CORE Figure C-36. Verbal (VE),

APPENDIX D: RAW SCORE FREQUENCIES MEPS (ASVAB 11A)

AND RTCS (VERSION 12A)

Note: The raw score frequencies provided for "MEPS 158" are the frequencies for ASVAB 11a administered in the MEPS. The table titled "RTC-1(370)" represent the frequencies for ASVAB 12a administered in the Services' Recruit Training Centers. These tables can be used to evaluate equating graphs in Appendix C.

Table D-1. Test MEPS (158)

	ÇS	AR	WK	PC	МО	cs	AS	МК	MC	EI	VE	AFQT
0	0	0	1	3	0	0	6	2	0	. 0	0	0
1	1	2	0	23	0	0	11	29	9	9	0	0
2	16	24	5	61	Ö	4	35	111	21	53	0	0
3	42	55	5	133	4	6	110	233	67	128	2	0
4	103	129	14	263	3	8	213	485	148	291	2	0
5	162	235	18	448	6	14	344	754	284	605	5	0
6	246	360	40	683	8	17	529	1021	497	796	4	0
7	344	488	63	957	16	20	638	1214	706	1139	3 13	0
8	450	652	92	1255	23	10	785	1227	888 1028	1296 1432	14	ŏ
9	586	776	124	1512	28	18	850	1273				
10	686	881	142	1615	27	21	936	1209	1225	1564	24	0
11	824	950	190	1704	22	25	977	1061	1376	1377	51	1
12	860	1043	220	1838	34	34	1008	975	1483	1357	64	1
13	1040	1086	308	2083	58	41	1085	916	1535	1358	56	0
14	1187	1179	347	2306	72	37	1177	818	1686	1199	83	0
15	1175	1061	379	2353	78	28	1153	702	1788	1159	96	3
16	1214	1167	375		98	58	1204	683	1767	1078	105	2
17	1130	1133	425		108	67	1230	663	1815	930	130	1
18	1155	1168	466		158	78	1208	617	1778	797	157	3
19	1148	1120	535		179	84	1271	594	1741	581	190	4
20	1054	1091	596		217	89	1324	557	1699	321	262	6
21	1023	1203	613		257	105	1385	516	1581		247	3
22	984	1066	700		342	112	1304	450	1316		273	8
23	869	1129	717		372	112	1261	500	1008		289	10
24	768	1160	726		428	136	1058	486	674		288	5
25	466	1099	796		509	145	584	427	253		318	14
26		1169	789		510	182					. 357	4
27		1209	840		614	215					373	9
28		1242	893		680	250					368	10
29		1317	896		707	226					462	11
30		921	916		768	253					501	14
31			904		816	284					450	15
32			948		965	300					530	21
33			1001		834	311					515	19
34	•		1026		805	328					550	22
35			1127		716	377					549	21
36					796	366					557	20
37					706	447					578	28
38					630	490					592	40
39					525	497					626	34
40					488	508					634	44
41					423	469					658	50
42					356	564					663	55
43					330	521					673	62
44					285	547					658	66

Table D-1. (Continued)

	GS	AR	WK	PC	но	cs	AS	YK.	HC	EI	YE.	AFQT
45 46 47					265 244 292	612 607 543				•	683 726 712	61 75 52
48					394	513					737	72
40					334	213					737	73
49					468	510					770	69
50					534	512					639	96
51						521						r 97
52						513						89
53						470						97
54						409						108
55						408						109
56	•											109
57						496						112 130
<i>51</i>						290						130
58						283	•					137
59						266						125
60						236						131
61						222						145
62						196						155
63						194						148
64						145						157
65						131						136
66						124						163
67						119						154
68						80						169
69						80 77						142
70						73						157
71						84						157
72			•			56 55						168
73						48	•					156
74						40						184
'						40						166
75						31						159
76						25						158
77						34						190
78						30						146
79						30 14						153
80					•							
81						19						162
82						22						197
67						25						166
83						20 46						161
84						46						170
85												169
86												149
87												160
88												144
89												142

Table D-1. (Concluded)

	cs	AR	WK	PC	Ю	 AS	HIK	HC	EI	AE	AFQT
90									•		175
91											153 155
91 92 93											155
93											147
94											168
95											125
9.5											122
70 07											127
00											81
96 97 98 99											78
100											66
101											72
102											46
103											39 43
104											43
104											
105											23
											_

Table D-2. Test RTC-1 (370)

	CS	AR	wk	PC	МО	CS	AS	HOK	нс	EI	VE	AFQT
0	0	G	0	o	o	0	1	1	1	0	0	0
1	0	0	0	2	1	0	1	4	2	2	0	0
2	0	0	0	13	0	0	4	22	2	10	0	0
3	2	1	0	25	0	0	8	35	8	7	0	0
Å	0	2	0	38	0	2	18	59	14	16	, 0	0
5 6	5 8	7 23	2	58	1	1	40	96	23	33	0	0
7	14		2	99	1	4	37	90	35	67	0	0
8	25	21 35	2 7	132 148	1	2	61	111	61	83	0	0
9	43	45	6	196	2 1	1	80 75	146 112	72 80	108 124	1 0	0 0
10	57	65	12	204	3	1	82	121	98	164	2	0
11	93	62	12	223	3	i	86	118	123	189	4	Ŏ
12	105	75	17	203	7	3	87	118	122	147	2	Ō
13	124	89	27	229	11	1	105	103	129	179	4	0
14	128	94	13	250	8	5	118	115	140	150	9	0
15	150	99	19	220	9	5	119	85	101	166	10	0
16	139	99	26		11	4	110	92	140	153	4	0
17	188	92	44.		10	10	115	85 .	146	158	8	0
18	152	98	53		24	3 7	111	94	129	+125	16	0
19	156	125	57		29	. 7	138	71	114	10 I	14	0
20	139	104	57		38	16	159	74	117	58	15	0
21	137	110	72		40	11	141	76	127		19	2
22	107	111	77		33	21	137	72	95		19	ō
23	113	99	74		53	10	120	71	86		20	ŏ
24	92	83	91		57	16	73	37	50		25	ŏ
25	63	111	90		64	20	14	32	25		44	1
26		108	114		59	20				•	42	0
27		82	115		63	22					34	1
28		83	108		71	28					60	0
29		70	137		66	19					4,7	2
3 0 3 1		47	137		69	23					51	4
32			164		115	22					54	3
33			135 137		88	35					49	1
34			132		98 82	38 35					58 83	3 2
35			101		83	35					89	2
35 36					75	40					85	8
37					77	49					84	1
38					70	38					72	3 5
39					80	29					86	4
40					65	60		•			94	8
41					49	49					84	8 8
42					39	55					79	5
43					43	53					107	9
44					39	68					88	11

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Table D-2. (Continued)

	CS	AR	VK	PC	МО	CS	AS	юк	HC	EI	VE	AFQT
45					48	60			•		82	7 12
46					38	62					96	12
47					48	52					96 98	15
48					64	52					94	14
46 47 48 49					61	62 52 52 60					64	14 15
50 51 52 53 54				·	43	46 44					44	. 8
51						44					•	17
52						66 62 49						18 21 20
53						62						20
55				•		52 61						28
56						61						27
57						53						32
58						42						33
56 57 58 59						53 42 42						32 33 43
60 61 62 63 64		•	•			41 25 27 30 28						29
61						25						33
62						27						33 29 44 49
63						30						44
65						26						43
66 67 68 69						28						45
67						21						38
68						18						44
69						28 21 18 12						43
70						19						39 55 49
71						15						55
72						9						49
73						10	•					61
70 71 72 73 74						19 15 9 10 8	•					49
75 76 77 78 79						6 5 2 6 7						43
76						5						39
77						2						48
78						6						45 37
79						7						37
80						6						46
81						3						50
81 82 83						6 3 4						40
83						11						38
84						11 7						61
85												47
86												53
87												50
86 87 88												37 33
89												33

CONTROL STATES BOARDS TOUGHT WASHING HOUSES DESIGNATED TOUGHTS TOUGHTS TOUGHTS TOUGHTS TOUGHTS TOUGHTS TOUGHTS

Table D-2. (Concluded)

	CS	AR	NK .	PC	NO	CS	AS	HIK	HC	EI	VE	AFQT
90									•			47
91												
91 92 93												38 24
93												32
94												30
95												33
96											•	25
97											-	18
98 9 9												20
99												23
100												17
101									•			7
102												7
103										•		4
104												3
105												3

APPENDIX E: AIR FORCE OPERATIONAL CONVERSION TABLES FOR ASVAB FORMS 11/12/13 USING THE 1980 YOUTH POPULATION

Note: Conversion tables for other, auxilliary operational tests (ASVABS 1Ux, 10y, 13c) are also included here, as is the conversion table for ASVAB 14, the high school test, in the interest of completeness.

Table E-1. Conversion of Raw Test Scores to Standard Scores

PJVI	<u>cs</u>	W	<u>ik</u>	PC	110	<u>cs</u>	P/M		RAW	<u>GS</u>	<u> </u>	<u>w</u>	PC	NO	<u>cs</u>	EVIA
0 1 2 3 4	22 24 25 27 29	26 26 28 29 30	21 22 23 24 25	21 24 27 29 32	20 20 20 20 20	21 22 22 23 24	0 1 2 3 4		45 46 47 48 49					58 59 60 61 62	49 49 50 50 51	45 46 47 48 49
5 6 7 8 9	31 32 34 36 38	32 33 34 35 37	26 27 29 30 31	35 37 40 42 45	20 20 21 22 23	24 25 25 26 27	5 6 7 8 9		50 51 52 53 54					හ	52 52 53 53 54	50 51 52 53 54
10 11 12 13 14	39 41 43 45 46	38 39 41 42 43	32 33 34 36 37	48 50 53 56 58	24 25 26 27 28	27 28 28 29 30	10 11 12 13 14		55 56 57 58 59						55 55 56 56 57	55 56 57 58 59
15 16 17 18 19	48 50 51 53 55	44 46 47 48 50	38 39 40 41 43	61	29 30 31 32 33	30 31 31 32 33	15 16 17 18 19		60 61 62 63 64						58 58 59 60 60	60 61 62 63 64
20 21 22 23 24	57 58 60 62 64	51 52 53 55 56	44 45 46 47 48		34 35 36 36 37	33 34 35 35 36	20 21 22 23 24		65 66 67 68 69						61 61 62 63 63	65 66 67 68 69
25 26 27 28 29	65	57 59 60 61 62	50 51 52 53 54		38 39 40 41 42	36 37 38 38 39	25 26 27 28 29		70 71 72 73 74						64 65 66 66	70 71 72 73 74
30 31 32 33 34		64	55 57 58 69		43 44 45 46 47	39 40 41 41 42	30 31 32 33 34		75 76 77 78 79						67 67 68 69 69	75 76 77 78 79
35 36 37 38 39			61		49 49 50 51 52	42 43 44 44 45	35 36 37 33 39		80 81 82 83 84						70 71 71 72 72	83 84
40 41 42 43 44					53 54 55 56 57	45 46 47 47 43	40 41 42 43 44									

Table E-1. (Concluded)

KVA	<u>vs</u>	· K	MC	<u>EI</u>	<u>VE</u>	RN	RAW	<u>ns</u>	<u>MK</u>	MC	<u>E1</u>	VE	RAN
0 1 2 3 4	26 27 29 31 32	31 32 34 35 36	24 24 25 27 29	26 28 30 32 34	20 21 21 22 23	0 1 2 3 4	25 26 27 28 29	68	67	69		41 41 42 43 44	25 26 27 28 29
5 6 7 8 9	34 36 37 39 41	38 39 41 42 44	31 33 35 37 38	37 39 41 43 45	24 25 26 26 27	5 6 7 8 9	30 31 32 33 34					45 46 46 47 .48	30 31 32 33 34
10 11 12 13 14	42 44 46 47 49	45 47 48 49 51	40 42 44 46 48	48 50 52 54 56	28 29 30 31 31	10 11 12 13 14	35 36 37 38 39					49 50 51 51 52	35 36 37 38 39
15 16 17 18 19	51 53 54 56 58	52 54 55 57 58	50 52 54 55 57	58 61 63 65 67	32 33 34 35 36	15 16 17 18 19	40 41 42 43 44					53 54 55 56 56	40 41 42 43 44
20 21 22 23 24	59 61 63 64 66	60 61 63 64 65	59 61 63 65 67	69	36 37 38 39 40	20 21 22 23 24	45 46 47 48 49 50					57 58 59 60 61	45 46 47 48 49 50

Table E-2. ASVAB 12a Conversion of Raw Test Scores to Standard Scores

PAN	<u>\alpha</u>	<u>AR</u>	<u>ık</u>	PĈ	110	<u>cs</u>	RVI		RAW	<u>æ</u>	NR	Ж	PC	<u>NO</u>	<u>cs</u>	INI
0 1 2 3 4	20 22 24 26 28	26 26 26 28 29	21 22 23 24 25	22 25 27 30 33	20 20 20 21 21	22 23 23 24 25	0 1 2 3 4		45 46 47 48 49					60 61 62 63 64	49 49 50 50 51	45 46 47 48 49
5 6 7 8 9	30 31 33 35 37	30 32 33 35 36	26 28 29 30 31	35 38 41 43 46	22 23 24 25 26	25 26 26 27 27	5 6 7 8 9		50 51 52 53 54					65	52 52 53 53 54	50 51 52 53 54
10 11 12 13 14	39 41 43 45 46	37 39 40 42 43	32 33 35 36 37	49 51 54 57 59	27 28 29 30 31	28 29 29 30 30	10 11 12 13 14	·	55 56 57 58 59						54 55 56 56 57	55 56 57 58 59
15 16 17 18 19	48 50 52 54 56	44 46 47 49 50	38 39 40 42 43	62	32 33 34 35 36	31 32 32 33 33	15 16 17 18 19		60 61 62 63 64						57 58 59 59 60	60 61 62 63 64
20 21 22 23 24	58 59 61 63 65	51 53 54 56 57	44 45 46 47 49		37 37 38 39 40	34 35 35 36 36	20 21 22 23 24		65 66 67 68 69						60 61 61 62 63	65 66 67 68 69
25 26 27 28 29	67	58 60 61 63 64	50 51 52 53 54		41 42 43 44 45	37 37 38 39 39	25 26 27 28 29		70 71 72 73 74						63 64 64 65 66	70 71 72 73 74
30 31 32 33 34		65	56 57 58 59 60		46 47 48 49 50	40 40 41 42 42	30 31 32 33 34		75 76 77 78 79						66 67 67 68 68	75 76 77 78 79
35 36 37 38 39			61		51 51 52 53 54	43 43 44 44 45	35 36 37 38 39		80 81 82 83 84						69 70 70 71 71	60 61 62 83 84
40 41 42 43 44					55 56 57 58 59	46 46 47 47 48	40 41 42 43 44									

Table E-2. (Concluded)

30 March 1984

RAH	· <u>23</u>	<u>ik</u>	ir	<u>E1</u>	VE	RAN	DVM	<u>AS</u>	<u>IK</u>	MC	EI	<u>ve</u>	RAH
0 1 2 3 4	27 29 31 32 34	31 33 34 35 37	24 24 26 28 30	23 26 28 30 32	20 21 21 22 23	0 1 2 3 4	25 26 27 28 29	69	67	70		41 41 43 43 44	25 26 27 28 29
5 6 7 8 9	35 37 39 41 42	38 40 41 43 44	32 34 36 37 39	35 37 39 41 44	24 25 26 26 27	5 6 7 8 9	30 31 32 33 34					45 46 47 48 49	30 31 32 33 34
10 11 12 13 14	44 46 47 49 51	45 47 48 50 51	41 43 45 47 49	46 48 50 53 55	28 29 30 31 32	10 11 12 13	35 36 37 38 39					49 50 51 52 53	35 36 37 38 39
15 16 17 18 19	52 54 56 57 59	52 54 55 57 58	51 53 54 56 58	57 59 62 64 66	32 33 34 35 36	15 16 17 18 19	40 41 42 43 44					54 55 55 56 57	40 41 42 43 44
20 21 22 23 24	61 62 64 65 67	59 61 62 64 65	60 62 64 66 68	68	37 38 38 39 40	20 21 22 23 24	45 46 47 48 49					58 59 60 60 61	45 46 47 48 49
							50					62	50

Table E-3. ASVABs 10x/10y/13c/14 Conversion of Raw Test Scores to Standard Scores

<u> P/21</u>	<u>cs</u>	<u>M</u>	<u>IK</u>	PC	110	<u>cs</u>	RVV		RAW	<u>cs</u>	W	W	PC	<u>NO</u>	<u>cs</u>	RW1
0 1 2 3 4	20 20 22 24 26	26 27 28 30 31	20 20 20 20 20 21	20 20 23 26 29	20 20 20 20 20	22 22 23 23 24	0 1 2 3 4		45 46 47 48 49					57 58 59 60 61	48 49 50 50 51	45 46 47 48 49
5 6 7 8 9	28 30 32 34 36	32 34 35 36 38	22 24 25 26 28	32 35 38 41 44	20 21 22 23 24	25 25 26 26 27	5 6 7 8 9		50 51 52 53 54					62	51 52 53 53- 54	50 51 52 53 54
10 11 12 13 14	38 40 42 44 46	39 40 42 43 45	29 30 31 33 34	47 50 53 56 59	25 26 27 28 28	28 28 29 29 30	10 11 12 13 14		55 56 57 58 59						54 55 56 56 57	55 56 57 58 59
15 16 17 18 19	48 50 52 54 56	46 47 49 50 51	35 37 38 39 41	62	29 30 31 32 33	31 31 32 32 33	15 16 17 18 19		60 61 62 63 64				•		57 58 59 59 60	60 61 62 63 64
20 21 22 23 24	58 60 62 64 66	53 54 55 57 58	42 43 44 46 47		34 35 36 37 38	34 34 35 35 36	20 21 22 23 24		65 66 67 68 69						60 61 62 62 63	65 66 67 68 69
25 26 27 28 29	68	59 61 62 64 65	48 50 51 52 54		39 40 41 41 42	37 37 38 38 39	25 26 27 28 29		70 71 72 73 74						63 64 65 65 66	70 71 72 73 74
30 31 32 33 34		66	55 56 57 59 60		43 44 45 46 47	39 40 41 41 42	30 31 32 33 34		75 76 77 78 79						66 67 68 68 69	75 76 77 78 79
35 36 37 33 39			61		49 49 50 51 52	42 43 44 44 45	35 36 37 33 39		80 81 82 83 84						69 70 71 71 72	83 84
40 41 42 43 41					53 53 54 55 56	45 46 47 47 48	40 41 42 43 44	·	79							

Table E-3. (Concluded)

P/\/	<u>NS</u>	1K	ic	EI	VE	RAN	RAH	<u>as</u>	<u>IK</u>	MC	EI	VE	RNIV
0 1 2 3 4	24 26 28 30 31	29 30 32 33 35	24 25 27 29 31	23 25 27 30 32	20 20 20 20 20	0 1 2 3 4	25 26 27 28 29	69	68	70		38 39 40 41 42	25 26 27 28 29
5 6 7 8 9	33 35 37 39 40	37 38 40 41 43	33 35 37 38 40	34 37 39 42 44	20 20 21 22 23	5 6 7 8 9	30 31 32 33 34					43 44 45 46 47	30 31 32 33 34
10 11 12 13 14	42 44 46 43 49	44 46 48 49 51	42 44 46 48 50	46 49 51 53 56	24 25 26 27 28	10 11 12 13 14	35 36 37 38 39					48 49 50 51 52	35 36 37 38 39
15 16 17 18 19	51 53 55 57 58	52 54 55 57 58	52 53 55 57 59	58 60 63 65 68	29 30 31 32 33	15 16 17 18 19	40 41 42 43 44					53 54 · 54 · 55 55	40 41 42 43 44
20 21 22 23 24	60 62 64 66 67	60 62 63 65 66	61 63 65 67 68	70	34 35 36 37 37	20 21 22 23 24	45 46 47 48 49					57 58 59 60 61	45 46 47 48 49
							50					62	50

Table E-4. Armed Forces Qualification Test (AFQT) ASVABs 11a/11b/12a/12b/13a/13b 1980 Percentile Equivalents

RAW AFOT SCOPE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW APQT SCORE	PERCENTILE	PAN NFOT	PERCENTILE	RAW NTQT SCORE	PERCENTILE
0.0	1	21.5	2	43.0	12	64.5	30	86.0	64
0.5	1	22.0	2	43.5	12	65.0	31	86.5	65
1.0	1	22.5	2 2 2	44.0	13	65.5	32	87.0	66
1.5	Ī	23.0	2	44.5	13	66.0	32	87.5	67
2.0	ļ	23.5	3 3	45.0	13	66.5	33	88.0	68
2.5	1	24.0		45.5	14	67.0	34	88.5	69
3.0	Į 3	24.5	3 3	46.0	14 14	67 . 5	34 25	89.0	70
3.5	1	25.0 25.5	<u>კ</u>	46.5	14 15	68.0	35 36	89.5	71
4,0 4.5	1 1	25.5 26.0	3 3	47.0	15 15	68.5	36 36	90.0	72 72
4.5 5.0	1	26.0 26.5	3 4	47 . 5 48 . 0	15 15	69.0 69.5	36 37	90.5 91.0	73 74
5.5	i	20.5 27.0	4	48.0 48.5	15 16	70.0	38	91.0	74 75
6.0	i	27.5	4	49.0	16	70.0 70.5	38	92.0	75 76
5.5	i	28.0	4	49.5	16	70.5 71.0	39	92.5	70 77
7.0	i	28.5	4	50.0	.0 17	71.5	40	93.0	78
7.5	i	29.0	5	50.5	17	72.0	41	93.5	79
8. 0	i	29.5	5 5	51.0	18	72 . 5	41	94.0	80
8.5	1	30.0	. 5	51.5	18	73.0	42	94.5	81
9.0	1	30.5	5	52.0	18	73. 5	43	95.0	81
9.5	1	31.0	5	52.5	19	74.0	44	95.5	82
10.0	1	31.5	6	53.0	19	74.5	44	96.0	83
10.5	1	32.0	6	53.5	20	75.0	· 45	96.5	84
11.0	1	32.5	6	54.0	20	75. 5	46	97.0	85
11.5	Ī	33.0	6	54.5	21	76.0	47	97.5	86
12.0	1	33.5	<u>7</u>	55.0	21	76.5	47	98.0	87
12.5	1	34.0	7	55.5	21	77.0	48	98.5	87
13.0	1	34.5	7	56.0	22	77.5	49	99.0	88
13.5	i i	35.0	/	56.5	22	78.0	49 50	99.5	89
14.0	1	35.5 36.0	7	57 . 0	23	78 . 5	50 53	100.0	90
14.5	i 1	36.0 36.5	8	57.5	23	79.0	51 52	100.5	91
15.0 15.5	1	36.5 37.0	8 8	58.0 58.5	24 24	79.5 80.0	52 53	101.0 101.5	92 93
16.0	i	37.0 37.5	9	59 . 0	24 25	80.0 80.5	53 53	101.5	93 93
16.5	i	37.5 38.0	9	59.5	25 25	80.5 81.0	53 54	102.0	93 94
17.0	i	38.5	9	60.0	25 26	81.5	54 55	103.0	94 95
17.5	i	39 . 0	10	60.5	26 26	82.0	56	103.5	95 95
13.0	i	39.5	10	61.0	20 27	82. 5	50 57	103.5	97
19.5	i	40.0	10	61.5	27	83.0	58	101.5	97
19.0	ż	40.5	ii	62.0	27	83.5	5 9	105.0	98
19.5	2	41.0	ii	62.5	28	84.0	60		j
20.0	2	41.5	ii	63.0	28	84.5	61		:
20.5	2	42.0	ii	63.5	29	85.0	62		
21.0	2	42.5	12	64.0	30	85.5	63		

Table E-5. Armed Forces Qualification Test (AFQT)
ASVAB 12a 1980 Percentile Equivalents

PAN APQT		דעדת ועמ	DOWN THE F	RAM MUT	DEDOCEMENT F	BVM VLOI	PORCENTILE	ran ardt Scoiæ	P ercent ii.c
SCOPE	PRIMITILE	SCORE	PERCENTILE	SCOPE	PERCENTILE	SCOIE	PERCENTILE	- COME	I Break II.L
0.0	1	21.5	2	43.0	13	64.5	32	86.0	70
0.5	Ì	22.0	2	43.5	13	65.0	33	86.5	71
1.0	1	22.5	2 2 3 3 3 3	44.0	13	65.5	34 55	87.0	72 72
1.5	1	23.0	2	44.5	14	66.0	35 36	87.5	73 74
2.0	j	23.5	3	45.0	14	66.5	36 36	88.0 88.5	74 75
2.5	1	24.0	3	45.5	14	67.0	30 37	89.0	75 76
3.0	1	24.5	3	46.0	15 15	67.5 68.0	37 38	89.5	70 77
3.5	į	25.0	3 3	46.5 47.0	15	68.5	38	90.0	78
4.0	į	25.5	3	47.5	16	69.0	- 39	90.5	79
4.5 5.0	ļ	26.0 26.5	4	48.0	16	69.5		91.0	80
5.0 5.5	;	27.0	4	48.5	16	70.0	40 41	91.5	80
6.0	i	27.5	4	49.0	17	70.5	42	92.0	81
6.5	i	28.0	4	49.5	17	71.0	42	92.5	82
7.0	i	28.5	4	50.0	18	71.5	43	93.0	83
7.5	i	29.0	5	50.5	18	72.0	44	93.5	84
8.0	i	29.5	5 5	51.0	18	72.5	45	94.0	85
8.5	1	30.0	5	51.5	19	73.0	45	94.5	86
9.0	1	30.5	5	52.0	19	73.5	46	95.0	87
9.5	1	31.0	6	52. 5	20	74.0	47	95.5	88 90
10.0	j	31.5	6	53.0	20	74.5	47 40	96.0	89 90
10.5	1	32.0	6	53. 5	21	75.0	48 49	96.5 97.0	90 90
11.0	<u>l</u>	32.5	6	54.0	21	75.5 76.0	50	97.5	91
11.5	Ţ	33.0	6	54. 5	22	76.5	50	98.0	92
12.0	į	33.5	7	55. 0 55. 5	22 23	70.5 77.0	51	98.5	93
12.5	ļ	34.0	7	56.0	23	77.5	52	99.0	94
13.0	1	34.5 35.0	7	56. 5	24	78.0	53	99.5	95
13.5 14.0	1	35.5	8	57. 0	24	78.5	54	100.0	96
14.5	,	36.0	8	57. 5	25	79.0	55	100.5	96
15.0	j	36.5	8	58.0	25	79.5	56	101.0	97
15.5	i	37.0	9	58.5	26	80.0	57	101.5	98
16.0	1	37.5	9	59.0	26	80.5	58	102.0	93
16.5	j	38.0	9	59. 5	27	81.0	59	102.5	99
17.0	1	38.5	10	60. 0	27	81.5	60	103.0	99
17.5	1	39.0	10	60. 5	28	82.0	61	103.5	9) 02
15.0	1	39.5	10	61.0	28	82.5	63	101.0	99 99
18.5	1	40.0	11	61.5	29	83.0	64 65	191.5	99
19.0]	40.5]]	62. 0	29 20	33.5 54.0	65 66	105.0	,,,
19.5	Ī	41.0	11	62.5	30	81.0 84.5	67		
20.0	2	41.5	12	63.0	31	84.5 คร.0	68		
20.5	2	42.0	12	63.5	31 32	85.5	69		
21.0	2	42.5	12	64.0	. 32	03,3			

Table E-6. Armed Forces Qualification Test (AFQT)
ASVABs 10x/10y/13c/14
1980 Percentile Equivalents

		-		30 F	narch 1904				
RAW APROT		PAN AROT		TOWN HAVE		RALL ARUT		RAW ARIT	
SCORE	PERCHATILE	score"	PEMINITE	ANUE,	BURGHUME	SCORE	PERCENTILE	S0018:	PERCENTIL I
0.0	1	21.5	1	43.0	11	64.5	30	86.0	67
0.5	j	22.0	ì	43.5	11	65.0	30	86.5	68
1.0	i	22.5	1	0	ii	65.5	31	87.0	69
1.5	i	23.0	ì	44.5	12	66.0	32	87.5	70
2.0	3	23.5	j	45.0	12	66.5	32	88.0	71
	i	24.0	ż	45.5	12	67.0	33	88.5	72
2.5	1	24.5	2	46.0	13	67. 5	34	89.0	73
3.0	,		2		13	68.0	35	89.5	74
3.5	:	25.0	2	46.5			33 3E	90.0	75
4.0	1	25.5	2	47.0	13	68.5	35 36	90.5	75 76
4,5	1	26.0	2	47.5	14	69.0	36		
5.0	1	26.5	2 2	48.0	14	69.5	37	91.0	77
5.5	1	27.0	2	48.5	14	70.0	38	91.5	78
6.0	1	27.5	3	49.0	15	70.5	38	92.0	79
6.5	1	28.0	3	49.5	15	71.0	3 9	92.5	80
7.0	1	28.5	3	50.0	16	71.5	40	93.0	81
7.5	1	29.0	3	50.5	16	72.0	41	93.5	82
8.0	1.	29.5	3	51.0	16	72.5	42	94.0	ಕ3
8.5	i	30.0	4	51.5	17	73.0	42	94.5	84
9.0	i	30.5	À	52.0	17	73.5	43 .	95.0	8 5
9.5	i	31.0	4	52.5	17	74.0	44	95.5	86
10.0	i	31.5	4	53.0	18	74.5	45	96.0	87
10.5	;	32.0	4	53.5	18	75.0	46	96.5	88
	1	32.5	5	54.0	19	75 . 5	46	97.0	89
11.0	1		5 F	54.5	19	76 . 0	47	97.5	90
11.5	ļ	33.0	5 5 5			76.5		98.0	91
12.0	ļ	33.5	5	55.0	20		48		92
12.5	1	34.0	5	55.5	20	77.0	49	98.5	93 ·
13.0	1	34.5	6	56.0	21	77.5	49 50	99.0	
13.5	1	35.0	6	56.5	21	78.0	50	99.5	94
14.0	1	35.5	6	57. 0	22	78.5	51	100.0	94
14.5	1	36.0	6	57.5	22	79.0	52	100.5	95
15.0	1	36.5	6	58.0	23	79.5	53	101.0	96
15.5	1	37.0	7	58.5	23	0.08	54	101.5	97
16.0	1	37.5	7	59.0	24	ಬ.5	55	102.0	93
16.5	1	38.0	7	59.5	24	81.0	56	102.5	22
17.0	1	38.5	8	0.0	25	81.5	57	103.0	99
17.5	i	39.0	8	60.5	25	82.0	58	103.5	99
15.0	. ;	39.5	8	61.0	26	82.5	59	104.0	59
18.5	i	40.0	8	61.5	26	83.0	60	104.5	93
15.5	1	40.5	9	62.0	27	£3.5	62	105.0	99
	,	41.0	9	62.5	27	84.0	63		
19.5	,		10	63.0	28	84.5	64		{
20.02	!	41.5				85.0	65		}
20.5	Į	42.0	10	63.5	28		65		i
21.0	1	42.5	10	64.0	29	85.5	00		[

APPENDIX F: US ARMY
CONVERSION TABLES ASVABS 11/12/13/14
1980 COMPOSITE SCORE EQUIVALENTS

Note: Conversion tables follow for this Laboratory's versions of Army Composites CL, MM, SC, CO, FA, and OF. Composites GT, GM, EL, and ST were previously provided by the Center for Naval Analyses and are available in Maier, M. H., and Sims, W. H. (1982). Constructing an ASVAB score scale in the 1980 Reference Population. Center for Naval Analyses Report 82-3118.

Table F-1. Conversion of Sum of Subtest Standard Scores (SSS)

To Army Standard Scores (SS)

Adjusted CL Composite (CL = NO + CS + VE)

\$55	ARITY SS	\$\$ \$	ARTIY SS	222	ARIAY SS	SSS	ARMY. SS
60	31	109	69	158	106	199	138
61	32	110	69	159	107	200	138
62	33	111	70	160	108	201	139
63	33	112	71	161	108	202	140
64	34	113	72	162	109	203	141
65	35	114	72	163	110	204	141
66	36	115	73	164	111	205	142
67	36	116	74	165	112	206	143
68	37	117	75	166	112	207	144
69	38	118	76	167	113	208	145
70	39	119	76	168	114	209	145
71	39	120	77	169	115	210	146
72	40	121	., 78	170	115	211	147
73	41	122	79	171	116	212	148
74	42	123	79	172	117	213	148
75	43	124	80	173	iis	214	149
76	43	125	81	174	118	215	150
77	44	126	82	175	119	216	151
78	45	127	82	176	120	217	151
79	46	128	83	177	121	218	152
80	46	129	84	178	122	219	153
81	47	130	85	179	122	220	154
82	48	131	85	180	123	221	154
83	49	132	86	181	124	222	155
84	49	133	87	182	125	223	156
85	50	134	88	183	125	224	157
86	51	135	89	184	126	225	158
87	52	136	89	185	127	226	158
88	52	137	90	186	128	227	159
89	53	138	91	187	128	228	160
90	54	139	92	188	129	229	161
91	55	140	92	189	130	230	161
92	56	141	93	190	131	231	162
93	56	142	94	191	131	232	163
94	57	143	95	192	132	233	164
95	58	144	95	193	133	234	164
96	59	145	96	194	134	235	165
97	59	146	97	195	135	236	166
98	60	147	98	196	135	237	167
99	61	148	99 •	197	136	238	168
100	62	149	99	198	137	239	391
101	62	150	100			240	169
102	63	151	101				
103	64	152	102				
104	65	153	102				
105	66	154	103				
106	66	155	104				
107	67 60	156	105				
103	68	157	105				

Table F-2. Conversion of Sum of Subtest Standard Scores (SSS)

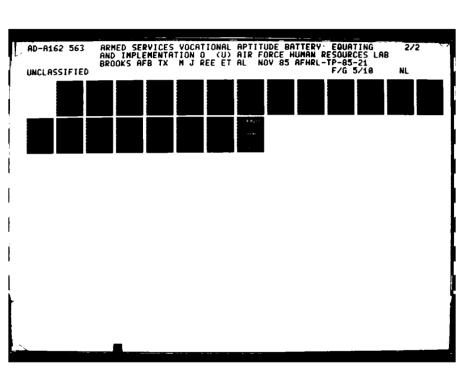
To Army Standard Scores (SS)

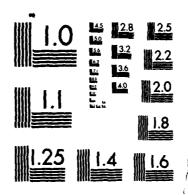
Adjusted MM Composite (MM = NO + AS + MC + EI)

		Adjusted mm	composite (181 - 110 1	, 72 , 110 , E	-,	
SSS	VKI IA	ss sss	viilu 22	SSS	ARHY SS	SSS	ARITY SS
00	27	131	58	182	89	233	120
80 81	27	132	58	183	90	234	121
82	28	133	59	184	90	235	121
83	28	134	60	185	91	236	122
84	29	135	60	186	92	237	123
85	30	136	61	187	92	238	123
86	30	137	62	188	93	239	124
87	31	138	62	189	93	240	125
88	32	139	63	190	94	241	125
89	32	140	63	191	95	242	126
90	33	141	64	192	95	243	126
91	33	142	65	193	96	244	127
92	34	143	65	194	96	245	128
93	35	144	66	195	97	246	128 129
94	35	145	66	196	98	247	129
95	36	146	67	197	98	248 249	130
96	36	147	68	198	99	250	131
97	37	148	68	199	99	250 251	131
98	38	149	69	200	100 101	252	132
99	38	150	69 70	201 202	101	253	133
100	39	151 152	70	202	102	254	133
101	40	152	71 71	203 204	102	255	134
102	40 41	153 154	71 72	205	103	256	134
103 104	41	155	7 3	206	104	257	135
104	42	156	73	207	104	258	136
105	43	157	74	208	105	259.	136
107	43	158	74	209	106	260	137
107	44	159	75	210	106	261	137
109	44	160	76	211	107	262	138
110	45	161	76	212	107	263	139
iii	46	162	77	213	108	264	139
112	46	163	77	214	109	265	140
113	47	164	78	215	109	266	140
114	47	165	79	216	110	267	141
115	48	166	79	217	110	268	142
116	49	167	80	218	111	269	142
117	49	168	81	219	112	270	143 144
118	50	169	81	220	112	271	144
119	51	170	82	221	113	272 273	145
120	51	171	82	222	114	273 274	145
121	52	172	8 3	223	114 115	275	146
122	52	173	84	224	115	276	147
123	53	174	84	225 226	116	277	147
124	54	175 176	8 5 8 5	227	117	278	148
125	54	176	86 86	228	117	279	148
126	55 56	177 178	87	229	116	280	149
127 128	55 56	178	87 87	230	i iõ	281	าร์ด์
129	50 57	160	88	231	119	282	150
130	57 57	181	£8	232	120	283	151
130	91	101	٥,,				

Table F-2. (Concluded)

SSS	ARMY 55	\$55	VIIIA 22	SSS	ARHY SS	SSS	VISITA 22
284	151	294	153	304	164	314	170
285	152	295	158	305	164	315	170
286	153	296	159	306	165	316	171
287	153	297	159	307	166	317	172
288	154	298	160	308	166	318	172
28 9	155	299	161	309	167	319	173
230	155	300	161	310	167	320	173
291	156	301	162	311	168		
292	156	302	162	312	169		
293	157	303	163	313	169		





MICROCOPY RESOLUTION TEST CHART NATIONAL BUREAU OF STANDARDS-1963-A

Table F-3. Conversion of Sum of Subtest Standard Scores (SSS)

To Army Standard Scores (SS)

Adjusted SC Composite (SC = NO + CS + AS + VE)

		valate	a se combas i	.e (30 - i			
SSS	AKIIY SS	\$8\$	NITY SS	\$\$\$	ARHY SS	SSS	ARHY SS
03	24	131	56	182	89	233	121
61	24	132	57	183	89	234	122
82	25	133	57	184	90	235	122
83	26	134	58	185	91	236	123
84	26	135	59	186	91	237	124
85	27	136	59	187	92	238	124
86	28	137	60	188	92	239	125
87	28	138	61	189	93	240	125
88	29	139	61	190	94	241	126
89	29	140	62	191	94	242	127
90	30	141	63	192	95	243	127
91	31 ·	142	63	193	96	244	128
92	31	143	64	194	96	245	129
93	32	144	64	195	97	246	129
94	33	145	65	196	98	247	130
95	33	146	66	197	98	248	131
96	34	147	66	198	99	249	131
97	35	148	67	199	99	250	132
98	35	149	68	200	100	251	132
99	36	150	68	201	101	252	133
100	36	151	69	202	101	253	. 134
101	37	152	70	203	102	254	134
102	38	153	70	204	103	255	135
103	38	154	71	205	103	256	136
104	39	155	żi	206	104	257	136
105	40	156	72	207	105	258	137
106	40	157	73	208	105	259	138
107	41	158	73	209	106	260	138
108	42	159	74	210	106	261	139
109	42	160	75	211	107	262	139
110	43	161	75	212	108	263	140
111	43	162	76	213	108	264	141
112	44	163	77	214	109	265	141
113	45	164	77	215	110	266	142
114	45	165	78	216	110	267	143
115	46	166	78	217	111	268	143
116	47	167	79	218	112	269	144
117	47	168	60	219	112	270	145
118	48	169	80	220	113	271	145
119	49	170	81	221	113	272	146
120	49	171	82	222	114	273	14G
121	50	172	82	223	115	274	147
122	50	173	83	224	115	275	148
123	51	174	84	225	116	27G	148
124	52	175	84	226	117	277	149
125	52	176	85	. 227	117	278	150
126	53	177	85	228	116	279	150
127	54	178	86	229	118	200	151
128	54	179	87	230	119	281	152
129	55	180	87	231	120	21;2	152
130	56	181	ខា	232	120	283	153

Table F-3. (Concluded)

SSS	NRTHY SS	\$ \$\$	VICIA 22	\$\$\$	VISITA 22	\$\$\$	ARMY SS
284 285 286 287 200 289 290 291 292	153 154 155 155 156 157 157 158 159	293 294 295 296 297 298 299 300 301	159 160 160 161 162 162 163 164 164	302 303 304 305 306 307 308 309 310	165 166 167 167 168 169 169	311 312 313 314 315 316 317 318 319 320	171 171 172 173 173 174 174 175 176

Table F-4 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted CO Composite (CO = CS + AR + MC + AS)

					•		·	
222	ARITY SS	<u> 222</u>	ARITY SS	<u> </u>	ARITY SS	<u> 555</u>	ARMY SS	
80	24	129	55	178	86	227	117	
81	25	130	56	179	87	228	118	
82	26	131	57	180	87	229	118	
83	26	132	57	181	88	230	119	
64	27	133	58	182	89	231	120	
85	28	134	58	183	89	232	120	
86	28	135	59	184	90	233	121	
87	29	136	60	185	91	234	122	
88	29	137	60	186	91	235	122 123	
89	30 ·	138	61	187	92	236	123	
90	31 .	139	62	188	93	237 -238	124	
91	31	140	62	189	93	239	125	
92	32	141	63	190	94 94	240	125	
93	33	142	63	191 192	94 95	241	126	
94	33	143	64	193	96	242	127	
95	34	144	65 65	194	96	243	127	
96	34	145 146	66	195	97	244	128	
97	35 36	140	6 7	196	98	245	128	
98 99	36 36	148	67	197	98	246	129	
100	30 37	149	68	198	99	247	130	
101	3 <i>7</i> 38	150	69	199	99	248	130	
102	38	151	69	200	100	249	131	
103	39	152	70	201	101	250	132	
104	40	153	70	202	101	251	132	
105	40	154	71	203	102	252	133	
106	41	155	72	204	-103	253	134	
107	41	156	7 2	205	103	251	134	
108	42	157	7 3	206	104	255	135	
109	43	158	74	207	104	256	135 136	
110	43	159	74	208	105	257	136	
111	44	160	75	209	106	258 259	137	
112	45	161	75	210	106 107	260	138	
113	45	162	76	211	107	261	139	
114	46	163	77	212 213	108	262	139	
115	46	164	77 78	214	109	263	140	
116	47	165 166	7.9 7.9	215	110	264	140	
117	48 48	167	79 79	216	iič	265	101	
118 119	49	168	60	217	111	266	10.2	
120	50	169	81	218	iii	2:.7	142	
121	50	170	31	219	112	268	1:3	
122	50 51	171	č?	220	113	269	144	
173	51	172	62	221	113	270	144	
124	5?	173	63	227	114	271	145	
125	53	174	84	223	115	272	146	
126	53	175	84	224	115	273	146	
127	54	176	85	225	116	271	147	
128	55	177	66	276	116	275	177	

Table F-4. (Concluded)

SSS	AKL:Y SS	<u> </u>	AKITY SS	255	ARIIY SS	222	ARILY SS
<u>555</u> 276	148	267	155	298	162	309	169
277	149	288	156	299	163	310	169
278	149	289	156	300	163	311	170
279	150	290	157	301	164	312	171
280	151	291	158	302	164	313	171
281	151	292	158	303	165	314	172
282	152	293	159	304	166	315	173
283	152	294	159	305	166	316	173
284	153	295	160	306	167	317	174
285	154	296	161	307	168	318	175
286	154 .	297	161	308	168	319	175
						320	176

Table F-5 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted FA Composite (FA = AK + CS + MC + MK)

The color of the		Adj	usted FA C	Composite (FA	= AK + (CS + MC + MK)		
81	<u>\$\$\$</u>	AKIIY SS	<u>\$\$\$</u>	ARTIY SS	<u>\$\$\$</u>	ARHY SS	<u>\$\$\$</u>	ARMY SS
81 26 132 59 103 90 234 121 82 29 134 60 185 91 236 122 84 30 135 61 186 92 237 122 85 31 137 62 188 93 239 124 86 31 137 62 188 93 239 124 87 32 138 63 190 94 241 125 89 33 140 64 191 95 242 125 89 33 140 64 191 95 242 125 89 33 140 64 191 95 242 125 89 34 142 65 193 96 244 127 91 34 142 65 193 96 244 127 93	03	28	131	58				
82 29 133 60 184 90 235 121 83 29 134 60 185 91 236 122 84 30 135 61 186 92 237 122 85 31 136 61 107 92 238 123 86 31 138 63 189 93 240 124 88 32 139 63 189 93 240 124 89 33 140 64 191 95 242 125 90 34 141 64 192 95 243 126 91 34 142 65 193 96 244 127 92 35 143 66 194 96 245 127 93 35 144 66 195 97 246 128 94				59	183	90		
83 29 134 60 185 91 236 122 84 30 135 61 186 92 237 122 85 31 137 62 188 93 239 124 87 32 138 63 189 93 239 124 88 32 139 63 190 94 241 125 89 33 140 64 191 95 242 125 89 34 141 64 192 95 243 126 91 34 142 65 193 96 244 127 92 35 143 66 194 96 245 127 92 35 143 66 195 97 246 128 94 36 145 67 196 98 247 129 95			133			90	235	
84 30 135 61 186 92 237 122 85 31 136 61 107 92 230 123 123 86 31 137 62 188 93 239 124 87 32 138 63 189 93 240 124 88 32 139 63 190 94 241 125 90 34 141 64 192 95 243 126 91 34 142 65 193 96 245 127 92 35 143 66 194 96 245 127 92 35 144 66 195 97 246 128 94 36 145 67 196 98 247 129 95 37 146 67 197 98 248 129 96 37 147 68 198 99 249 130 997 38 148 69 199 99 250 130 98 38 149 69 200 100 251 131 99 39 150 70 201 101 252 132 100 40 151 70 202 101 253 132 100 40 152 71 203 102 254 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 100 42 155 73 206 104 257 135 100 44 158 75 209 106 251 131 107 262 132 100 45 160 76 211 107 262 132 100 45 160 76 211 107 262 132 100 46 161 77 21 200 106 251 131 107 262 132 107 44 158 75 209 106 251 135 107 201 107 263 138 110 46 162 77 213 108 266 134 110 46 162 77 213 108 266 139 110 267 135 100 45 160 76 211 107 262 138 135 106 43 157 74 206 105 259 136 107 44 158 75 209 106 251 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 111 55 170 82 221 113 772 141 115 275 142 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 222 113 773 144 175 177 183 223 114 177 177 183 223 114 17							236	
85							237	122
86								
87								124
88		32						
89		32						
90 34 141 64 192 95 243 126 91 34 142 65 193 96 244 127 92 35 143 66 194 96 245 127 93 35 144 66 195 97 246 128 94 36 145 67 196 98 247 129 95 37 146 67 197 98 248 129 96 37 147 68 198 99 249 130 97 38 148 69 199 99 250 130 98 38 149 69 200 100 251 131 99 39 150 70 201 101 252 132 100 40 151 70 202 101 253 132 100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 208 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 162 77 213 108 264 139 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 267 141 115 49 166 80 217 110 267 141 115 49 167 80 216 111 269 142 117 50 168 81 219 112 270 142 119 51 169 81 220 112 271 143 120 52 177 83 222 113 273 144 121 52 177 83 222 113 273 144 121 52 177 83 223 114 274 145 122 53 173 84 224 115 277 147 123 54 174 84 224 115 277 147 124 54 175 85 226 116 277 147 125 55 176 86 227 116 277 147 127 56 178 87 229 118 281 149 128 57 179 86 227 116 270 148 127 56 178 87 229 118 281 149 128 57 177 86 227 116 270 148 129 57 160 88 231 119 282 150								
91 34 142 65 193 96 244 127 92 35 143 66 194 96 245 127 93 35 144 666 195 97 246 128 94 36 145 67 196 98 247 129 95 37 146 67 197 98 248 129 96 37 147 68 198 99 249 130 97 38 148 69 199 99 250 130 98 38 149 69 200 100 251 131 99 39 150 70 201 101 252 132 100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 103 41 154 72 205 103 255 133 103 41 154 72 205 103 255 133 103 41 154 72 205 103 255 134 104 42 155 73 206 104 257 135 106 43 157 74 208 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 268 141 115 49 166 80 217 110 268 141 115 49 166 80 217 110 268 141 116 49 167 80 216 110 267 141 117 50 168 81 219 112 270 142 119 51 170 82 221 113 772 142 119 51 170 82 221 113 772 143 121 52 177 83 223 114 274 145 122 53 177 86 227 116 278 117 127 56 178 87 229 118 281 119 128 57 179 87 229 118 281 119 129 57 179 87 229 118 281 119 120 57 179 87 229 118 281 119 121 57 179 87 229 118 281 179 122 57 160 88 231 119 282 159								
92 35 143 66 194 96 245 127 93 35 144 66 195 97 246 128 94 36 145 67 196 98 247 129 95 37 146 67 197 98 248 129 96 37 147 68 198 99 249 130 98 38 149 69 200 100 251 131 99 39 150 70 201 101 252 132 100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 206 105 259 136 108 44 159 75 208 105 259 136 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 110 267 141 117 50 168 81 219 112 270 142 120 52 171 83 223 114 274 145 121 52 55 176 86 227 116 228 177 127 56 178 87 229 118 281 149 128 57 179 87 230 118 281 149 129 57 160 88 231 119 282								127
93								
94 36 145 67 196 98 247 129 95 37 146 67 197 98 248 129 96 37 147 68 198 99 249 130 97 38 148 69 199 99 250 130 98 38 149 69 200 100 251 131 100 40 151 70 202 101 252 132 101 40 152 71 203 102 254 133 102 41 154 72 205 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 110 267 141 117 50 168 81 219 112 270 142 119 51 170 82 221 113 273 144 121 52 177 86 227 115 276 146 124 54 175 87 229 116 277 147 125 55 177 86 227 116 277 127 56 178 87 229 118 280 146 127 57 160 88 231 119 282 150								
95								120
96								
97 38 148 69 199 99 250 130 98 38 149 69 200 100 251 131 99 39 150 70 201 101 252 132 100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 102 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 208 105 259 136 108 44 159 75 210 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 115 49 166 80 217 110 267 141 115 49 166 80 217 110 268 141 115 49 166 80 217 110 268 141 115 49 166 80 217 110 268 141 115 49 166 80 217 110 268 141 116 49 167 80 216 110 267 141 117 50 168 81 219 112 270 142 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 145 122 53 173 84 224 115 275 145 123 54 174 84 225 115 276 146 124 54 175 85 226 116 277 147 125 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 280 148 129 129 57 160 88 231 119 782 150								
98								
99	97							
100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 105 43 156 73 207 104 258 135 106 43 157 74 206 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138	98	38						
100 40 151 70 202 101 253 132 101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 203 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138	99	39	150	70			252	
101 40 152 71 203 102 254 133 102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139		40	151	70	202	101		
102 41 153 72 204 103 255 133 103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 206 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 47 163 78 214 109 265 139 112 47 163 78 214 109 265 139					203	102	254	
103 41 154 72 205 103 256 134 104 42 155 73 206 104 257 135 105 43 156 73 207 104 258 135 106 43 157 74 206 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140						103	255	133
104								134
105 43 156 73 207 104 258 135 106 43 157 74 208 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141								135
106 43 157 74 206 105 259 136 107 44 158 75 209 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 263 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
107 44 158 75 203 106 260 136 108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 112 47 163 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 111 269 142 117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
108 44 159 75 210 106 261 137 109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 111 269 142 117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 119 51 170 82 221 113 277 161 <t< td=""><td></td><td></td><td></td><td></td><td>209</td><td>วิทัก</td><td></td><td></td></t<>					209	วิทัก		
109 45 160 76 211 107 262 138 110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 111 269 142 117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 <t< td=""><td>107</td><td></td><td></td><td></td><td>210</td><td></td><td></td><td>137</td></t<>	107				210			137
110 46 161 77 212 107 263 138 111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 216 111 269 142 117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 83 223 114 274 145 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
111 46 162 77 213 108 264 139 112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 113 51 169 81 220 112 271 143 119 51 170 82 221 113 272 141 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
112 47 163 78 214 109 265 139 113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 113 51 169 81 220 112 271 143 119 51 170 82 221 113 272 141 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 64 275 115 276 146 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
113 47 164 78 215 109 266 140 114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 113 51 169 81 220 112 271 143 119 51 170 82 221 113 272 141 120 52 171 83 222 113 273 144 120 52 172 63 223 114 274 145 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 64 275 115 276 146 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
114 48 165 79 216 110 267 141 115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 113 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 <t< td=""><td>112</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	112							
115 49 166 80 217 110 268 141 116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
116 49 167 80 218 111 269 142 117 50 168 81 219 112 270 142 113 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 65 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
117 50 168 81 219 112 270 142 118 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 65 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148								
118 51 169 81 220 112 271 143 119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 83 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
119 51 170 82 221 113 272 161 120 52 171 83 222 113 273 144 121 52 172 83 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150						112		
120 52 171 83 222 113 273 144 121 52 172 83 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150								
121 52 172 83 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 84 275 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150								
121 52 172 63 223 114 274 145 122 53 173 84 224 115 275 145 123 54 174 64 225 115 276 146 124 54 175 65 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 66 228 117 279 146 127 56 178 67 229 118 280 140 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150	120	5 <i>2</i>	171					
123 54 174 84 225 115 276 146 124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150	121	52		83				
124 54 175 65 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150	122	53	173	84	221	115		
124 54 175 85 226 116 277 147 125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150	123	54	174	84	225			
125 55 176 86 227 116 278 147 126 55 177 86 228 117 279 148 127 56 178 87 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150	124					116		147
126 55 177 86 228 117 279 148 127 56 178 67 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150						116	278	147
127 56 178 67 229 118 280 148 128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150								
128 57 179 87 230 118 281 149 129 57 160 68 231 119 282 150								148
129 57 160 68 231 119 282 150								
130 30 (01 0) 130 130		57 60						
	130	30	101	. ,				,,,,

Table F-5. (Concluded)

<u> 555</u>	ARHY SS	<u> 555</u>	MILLY SS	<u>\$\$\$</u>	NUTY SS	<u>\$\$\$</u>	ARITY SS
224	152	294	159	304	165	314	171
285	153	295	159	305	165	315	172
286	154	296	160	306	166	316	172
287	154	297	160	307	167	317	173
288	155	298	161	308	167	318	173
289	155	299	162	309	168	319	174
290	156	300	162	310	168	320	175
291	157	301	163	311	169		
292	157	302	163	312	170		
293	158	303	164	313	170		

Table F-6 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted FA composite (FA = AK + CS + MC + MK)

Adjusted FA composite (FA = AK + CS + MC + MK)											
<u> </u>	NIHY SS	<u>\$\$\$</u>	NITY SS	<u> </u>	Netty SS	<u> </u>	ARHY SS				
. 80	26	131	57	182	89	233	121				
ēī	26	132	58	183	90	234	121				
82	27	133	58	184	90	235	122				
83	27	134	59	185	91	236	122				
84	28	135	60	186	9i	237	123				
85	29	136	60	187	92	238	124				
86	29	137	61	188	93	239	124				
87	30	138	62	189	93	240	125				
88	30	139	62	190	94	241	126				
89	31	140	63	191	95	242	126				
90	32	141	63	192	95	243	127				
91	32	142	64	193	96	244	127				
92	33	143	65	194	96	245	128				
93	34	144	65	195	97	24G	129				
94	34	145	66	196	98	247	129				
95	35	146	67	197	98	248	130				
96	35	147	67	198	99	249	131				
97	36	148	68	199	99	250	131				
98	37	149	68	200	100	251	132				
99	37	150	69	201	101	252	132				
100	38	151	70	202	101	253	133				
101	39	152	70	203	102	254	134				
102	39	153	71 71	204	103	255	134				
103	40	154	72	205	103	256	135				
104	40	155	72	206	104	257	136				
105	41	156	73	207	104	258	136				
106	42	157	73	208	105	259	137				
107	42	158	74	209	106	260	137				
108	43	159	75	210	106	261	138				
109	44	160	75 75	211	107	262	139				
110	44	161	7 6	212	108	263	139				
111	45	162	76	213	108	264	140				
112	45	163	77	214	109	265	140				
113	46	164	78	215	110	266	141				
114	47	165	78	216	110	267	142				
115	47	166	79	217	iii	268	142				
116	48	167	80	218	111	269	143				
117	49	163	čŏ	219	112	270	144				
116	49	169	81	220	113	271	144				
119	50	170	81	221	113	272	145				
120	50	171	62	222	114	273	145				
121	51	172	63	223	114	274	146				
122	52	173	83	224	115	275	147				
123	52	174	64	225	116	276	147				
124	š3	175	85	226	116	277	143				
125	53	176	65	227	117	278	149				
126	54	177	86	228	117	2/9	149				
127	55	17.8	66	229	118	280	1 5 0				
128	55	179	87	230	119	261	150				
129	56	180	88	231	119	282	151				
130	57	181	88	232	120	283	152				
		• • •	** **		12.0	,,	,				

Table F-6. (Concluded)

<u>\$\$\$</u>	ARMY SS	<u> 555</u>	ARMY SS	222	ARMY SS	<u> 555</u>	ARMY SS
284	151	294	157	304	163	314	169
285	iši	295	157	305	164	315	170
286	152	296	158	306	164	316	170
287	153	297	159	307	165	317	171
288	153	298	159	308	165	318	171
289	154	299	160	309	166	319	172
290	155	300	161	310	167	320	173
291	155	301	161	311	167		
292	156	302	162	312	168		
293	156	303	162	313	168		

APPENDIX G: US MARINE CORPS
CONVERSION TABLES ASVABS 11/12/13/14
1980 COMPOSITE SCORE EQUIVALENTS

Note: These tables were provided by the Center for Naval Analyses and have been verified by this Laboratory. Please see CNA Memorandum 84-0426, 14 March 1984 on Marine Corps Aptitude Composite Tables for ASVAB 8/9/10/11/12/13/14 in the 1980 Reference Population by W. H. Sims.

Table G-1. US Marine Corps Conversion Tables
ASVABs 11/12/13/14
1980 Composite Scores Equivalents

STATES STATES STATES STATES

<u> </u>	MM	<u>CL</u>	GT	<u>EL</u>	<u>\$\$\$</u>		<u>\$\$\$</u>	MM	<u>CL</u>	<u>GT</u>	EL	<u>\$\$\$</u>
60-70		40	40		60-70		115	51	773	74	52	115
71		40	40		71		116	52	73	. 74	53	116
72		40	41		72		117	53	74	75	53	117
73		40	42		73		118	. 53	75	76	54	118
74		41	45		74		119	54	76	77	54	119
75		41	45		75		120	54	77	77	55	120
76		42	44		76		121	55	77	78	55	121
77		43	45		77		122	55	7B	79	56	122
78		44	46		78		123	56	79	80	57	123
79		45	46		79		124	57	80	80	57	124
80	40	45	47	40	BO .		125	57	80	81	58	125
81	40	46	48	40	81	•	126	58	81	82	58	126
82	40	47	49	40	82		127	58	82	83	59	127
83	40	48	49	40	83		128	59	83	83	59	126
84	40	48	50	40	84		129	59	84	84	60	129
85	40	49	51	40	85		130	60	84	85	60	130
86	40	·50	52	40	86		131	61	85	86	61	131
87	40			40	87		132	61	86	86	62	132
		51	52				133	62	87	87	62	133
88 .	40	52	53	40	88		. 134	62	88	88	63	134
89	40	52	54	40 .	89							
90	40	53	55	40	90		135	63	88	89	63	135
91	40	54	55	40	91		136	63	89	89	64	136
92	40	55	56	40	92		137	64	90	90	64	137
93	40	55	57	40	93		136	65	91	91	65	138
94	40	56	58	40	94		139	65	91	92	66	139
95	40	57	58	41	95		140	66	92	92	66	140
96	41	58	59	41	96		141	66	93	93	67	141
97	41	59	60	42	97		142	67	94	94	67	142
98	42	59	61	42	98		143	67	95	95	68	143
99	42	60	62	43	99		144	68	95	96	68	144
100	43	61	62	44	100		145	69	96	96	69	145
101	43	62	63	44	101		146	69	97	97	70	146
102	44	63	64	45	102		147	70	99	98	70	147
103	45	63	65	45	103		148	70	98	99	71	148
101	45	64	65	46	104		149	71	99	99	71	149
105	46	65	66	46	105		150	71	100	100	72	150
106	46	66	67	47	106	*	151	72	101	101	72	151
107	47	66	68	47	107		152	73	102	102	73	152
103	47	67	68	48	108		153	73	102	102	74	153
109	48	68	69	49	109		154	74	103	103	74	154
110	49	69	, 70	49	110		155	74	104	104	75	155
111	49	70	71	50	111		156	75	105	105	75	156
112	50	70	71	50	112		157	75	106	105	76	157
113	5 0	71	72				158	76	106	106	76	158
-				51	113.		159	77	107	107	77	159
114	51	72	73	51	114		177	• •	107		• •	• //

Table G-1. (Continued)

<u> </u>	MM	<u>CL</u>	<u>GT</u>	<u>EL</u>	<u>\$\$\$</u>		<u> SSS</u>	MM	<u>CL</u>	<u>GT</u>	EL	<u> 555</u>
160	77	10/3	100	77	160		205	103	143	142	103	205
161	78	109	108	70	161		206	103	144	142	103	506
162	78	109	109	79	162		207	104	145	143	104	207
163 164	79 79	110 111	110 111	79 80	163		208 209	105	145	144	105	208 208
104	15		111	ω	164	•	209	105	146	145	105	209
165	80	112	111	80	165		210	106	147	145	106	210
166	81	113	112	81	166		211	106	148	146	106	211
167	81	113	113	81	167		212	107	149	147	107	212
168	82	114	114	82	168		213	107	149	148	107	213
169	82	115	114	83	169		214	108	150	148	108	214
170	83	116	115	83	170		215	109	151	149	109	215
171	83	116	116	84	171		216	109	152	150	109	216
172	84	117	117	84	172		217	110	152	151	110	217
173	85	118	117	85	173		218	110	153	151	110	218
174	85	119	118	85	174		219	111	154	152	111	219
	0,	",	110	0)	1.74		,	•••	. ,4	1 72		217
175	86	120	119	86	175		220	111	155	153	111	220
176	86	120	120	87	176		221	112	156	154	112	221
177	87	121	120	87	177		222	113	156	154	113	222
178	87	122	121	88	178		223	113	157	155	113	223
179	88	123	122	88	179		224	114	158	156	114	224
180	89	123	123	89	100		225	•••	450		444	225
181	89	124	123	89	1 <i>8</i> 0 181		226	114	159	157	114	225
182	90	125	124				227	115	159	157	115	226
183	90	126	125	90	182		228	115	160	158	115	227
184	91	127		90	183			116	160	159	116	228
	91	127	126	91	184		229	117	160	160	116	229
185	91	127	127	92	185		230	117	160	160	117	230
186	92	128	127	92	186		231	118	160	160	118	231
187	93	129	128	93	187		232	118	160	160	118	232
188	93	130	129	93	188		233	119	160	160	1:9	233
189	94	131	130	94	189		234	119	160	160	119	234
190	94	131	130	94	190		235	120	160	160	120	235
191	95	132	131	95	191		236	121	160	160	120	236
192	95	135	132	96	192		237	121	160	160	121	237
193	96	134	133	96	193		238	122	160	160	122	•
194	97	134	133	97	194		239	122	160	160	122	258 239
195	07	4										
196	97 68	135	134	97	195		240	123	160	160	123	240
	93	136	135	93	196		241	123			123	241
197	93	137	136	98	197		242	124			124	242
198	99	133	136	99	193		243	125			124	243
199	99	130	137	100	195		244	125			125	244
200	100	139	133	100	200		245	126			126	245
201	101	140	139	101	201		246	126			126	246
505	101	141	139	101	202		247	127			127	247
203	102	141	140	10.7	203		249	127			127	2411
104	102	142	141	102	204		249	128			128	249
							- • •					. • ,

Table G-1. (Concluded)

<u> 555</u>	MM	<u>C1</u>	GI	<u>LL</u>	<u> 555</u>	<u> SSS</u>	MM	CL	<u>61</u>	£L	<u> 555</u>
240 251 252 253 254	129 129 130 130 131			128 129 130 130 131	250 251 252 253 254	295 296 297 298 299	154 155 155 156 157			154 154 155 156	295 296 297 298 299
255 256 257 258 259	131 132 133 133 134			131 132 132 133 133	255 256 257 258 259	300 301 302 303 304	157 158 158 159 159			157 157 158 158 159	300 301 302 303 304
260 261 262 263 264	134 135 135 136 137			134 135 135 136 136	260 261 262 263 264	305 306-320	160 160	••		159 160	309 306-320
2-5 266 267 269 269	137 138 138 139 139			137 137 138 139 139	265 266 267 268 269						
270 271 272 273 274	140 141 141 142 142			140 140 141 141 142	270 271 272 273 274						
275 276 277 278 279	143 143 144 145 145			143 143 144 144 145	275 276 277 278 279						
200 281 200 200 205 284	146 146 147 147 148			145 146 146 147 148	280 281 282 283						
235 226 287 288 283	149 149 150 150			149 149 149 150	284 2 8 5 2 8 6 287 288 289						
290 291 292 293 294	151 152 153 153			151 152 152 153 153	290 291 292 293 294						

HANDER BESTERES LANGUAGE INTEREST

APPENDIX H: US AIR FORCE APTITUDE COMPOSITES
ASVABs 11/12/13/14
1980 PERCENTILE SCORE EQUIVALENTS

Table H-1. US Air Force Aptitude Area Composites
ASVABS 11/12/13/14
1980 Percentile Score Equivalents
6 April 1984

<u>\$\$\$</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	<u> </u>	<u> \$\$\$</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	<u>\$\$\$</u>
40 41 42 43 44]]]]		40 41 42 43 44	80 81 82 83 84	1 1 1 1 1	2 2 2 2 2 2	18 19 20 21 22	1 1 1 1	80 81 82 83 84
45 46 47 48 49			1 1 1 1		45 46 47 48 49	85 86 87 88 89]]]]	3 3 3 3 3	23 25 26 27 29]]]]	85 86 87 88 39
50 51 52 53 54			1 1 1 1		50 51 52 53 54	90 91 92 93 94	1 1 1 1	4 4 4 4	30 32 33 34 36	1 1 1	90 91 92 93 94
55 56 57 58 59			1 1 1 1 2		55 56 57 58 59	95 96 97 98 99	1 1 1 1	5 5 5 5 6	37 39 41 42 44	1	95 96 97 98 99
60 61 62 63 64		1 1 1 1	2 3 4 4		60 61 62 63 64	100 101 102 103 104	1 1 1 1	6 6 7 7	46 48 50 52 53	1 1 1 1	100 101 102 103 104
65 66 67 68 69		1 1 1 1	5 5 6 7 8		65 66 67 68 69	105 106 107 108 109	1 1 1	7 8 8 8 9	55 57 59 62 64	1 1 1	105 106 107 108 109
70 71 72 73 74) 1 3 1	9 9 10 11 12		70 71 72 73 74	110 111 112 113 114]]]]	9 10 10 11 11	66 68 70 72 74]]]]	110 111 112 113 114
75 76 77 78 79		1 1 1 1 2	13 14 15 16 17		75 76 77 78 79	115 116 117 118 119	1 1 1 1	11 12 12 13 13	76 78 80 82 84	1	115 116 117 118 119

Table H-1. (Continued)

<u>sss</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	<u> </u>	<u>\$\$\$</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	<u> </u>
120 121	1	14 14	85 87	1	120 121	160 161	15 16	60 61		16 17	160 161
122	1	15	89	i	122	162	17	63		17	162
123	i	15	91	i	123	163	18	65		18	163
124	j	16	93	1	124	164	18	67		19	164
125	1	17	95	1	125	165	19	68		19	165
126	i	17	97	1	126	166	20	70		20	166
127	1	18	98	1	127	167	21	72		21	167
128	1	19	99	j	128	168	21	74 76		22 22	168 169
129	2	20 (Thru SSS	1	129	169 170	22 2 3	76 77		23	170
			= 160)								
130	2	20		1	130	171	24	79		24 25	171 172
131	2	21		1	131 132	172 173	25 26	80 82		26 26	173
132	2	22		1	132	173	26	83		27	174
133 134	2 3	23 24		2 2	133	175	27	85		28	175
										29	176
135	3	25		2 2	135 136	176 177	28 29	86 87		30	177
136 137	3	26 27		3	137	178	30	89		31	178
138	4 4	28		3	138	179	31	90		32	179
139	4	29		4	139	180	32	92		32	180
140	5	30		4	140	181	33	93		33	181
141	5 5	31		4	141	182	34	94		34	182
142	5	32		5	142	183	35	95		35	183
143	6	34		5	143	184	36	95		36	184
144	6	35		6	144	185	37	96		37	185
145	7	36		6	145	186	38	97		38	186
146	7	37		7	146	187	39	98		39	187
147	8	39		8	147	188	40	98		40	188
148	8	40		8	148	189	40	99		41	189
149	9	41		9	149	190	41	(Thru SSS		42	190
150	9	43		9	150	191	42	= 240)		43	191
151	10	45		10	151	192	43			43 44	192 193
152	11	46		11	152	193	44			45	193
153	11	48		11 12	153 154	194 195	45 46			46	195
154	12	50									
155	12	51		13	155	196	47			47 48	196 197
156	13	53		13	156	197	48 49			40 49	198
157	13	54		14 14	15 <i>7</i> 158	198 199	50			5U	199
158	14	56 58		14	159	177	30			30	
159	15	סכ		10	177						

lable H-1. (Concluded)

<u>\$\$\$</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	<u> </u>	<u> 555</u>	MECH (M)	ADMIN (A)	GEN (G)	ELEC	<u>sss</u>
200 201 202 203 204	51 52 53 54 55			50 51 52 53 54	200 201 202 203 204	235 236 237 238 239	81 81 82 83 83			81 81 82 83 84	235 236 237 238 239
205 206 207 208 209 210 211	56 57 58 59 60 60			55 56 57 58 59 60 61	205 206 207 208 209 210 211	240 241 242 243 244 245 246	84 85 86 86 87 88			85 86 86 87 88 88	240 241 242 243 244 245 246
212 213 214 215	62 63 64 65			62 62 63 64	212 213 214 215	247 248 249 250	89 89 90 91			90 90 91 92	247 248 249 250
216 217 218 219	66 67 68 68			65 66 67 67	216 217 218 219	251 252 253 254	91 92 92 93			92 93 93 94	251 252 253 254
220 221 222 223 224	69 70 71 72 72	·		68 69 70 71 72	220 221 222 223 224	255 256 257 258 259	93 94 94 95 96			95 95 96 96 97	255 256 257 258 259
225 226 227 228 229	73 74 74 75 76			72 73 74 75 76	225 226 227 228 229	260 261 262 263 264	96 96 97 97 98			97 98 98 98 99	260 261 262 263 264
230 231 232 233 234	77 78 78 79 80			76 77 78 79 80	230 231 232 233 234		98 98 99 hru SSS = 320)		(Thru = 32	SSS 0)	265 266 267

greet betreets treasured braness passesses

APPENDIX I: RAW SCORE CONVERSIONS (HALF POINT) OF AFQT TO PERCENTILES IN 1944 and 1980 METRICS

Table I-1. RAW Score Comparisons (Half Point) of Armed Forces Qualification Test (AFQT) to Percentiles in 1944 and 1980 Metrics 30 March 1984

					30 Mai	CII 1304					
RAW			RAW			RAW			RAW		
AFQT			AFQT			AFQT			AFQT		
SCORE	1944	1980	SCORE	1944	1980	SCÒRE	1944	1980	SCORE	1944	1980
0.0	1	j	26.5		2	52.0	18	17	77.5	- 4	49
0.5		1	27.0	4	2	52.5		17	78.0	54	50
1.0	1	1	2 7.5		3	53.0	19	18	78.5		51
2.0	1	1	28.0	5	3	53.5		18	79.0	56	52
2.5		1	28.5		3	54.0	20	19	79.5		53
3.0	1	1	29.0	5	3	54.5		19	80.0	58	54
3.5		1	29.5		3	55.0	20	20	80.5		55
4.0	1	i	30.0	6	4	55.5		20	81.0	59	56
4.5	•	1	30.5	•	4	56.0	21	21	81.5	•	57
5.0	1	i	31.0	6	4	56.5		21	82.0	61	58
5.5	•	i	31.5	U	4	57.0	22	22	82.5	01	59
	,	, 1	32.0	7	4	57.5	22	22	83.5	63	60
6.0	1	,		,			22			03	
6.5			32.5	,	5	58.0	23	23	83.0		62
7.0	1	ļ	33.0	7	5	58.5	• •	23	84.0	65	63
7.5		. !	33.5		5	59.0	24	24	84.5		64
8.0	1	1	34.0	8	5	59.5		24	85.0	66	65
8.5		1	34.5		6	60.0	25	25	85.5		66
9.0	1	1	35.0	8	6	60.5		25	86.0	68	67
9.5		1	35.5		6	61.0	26	26	86.5		68
10.0	1	1	36.0	9	6	61.5		26	87.0	70	69
10.5		1	36.5		6	62.0	28	27	87.5		70
11.0	1	ì	37.0	9	7	62.5	-	27	88.0	72	71
11.5	•	1	37.5	•	7	63.0	29	28	88.5		72
12.0	1	i	38.0	10	7	63.5		28	89.0	74	73
12.5	•	i	38.5		8	64.0	30	29	89.5	• •	74
13.0	1	i	39.0	10	8	64.5	30	30	90.0	76	75
13.5	•	i	39.5	10	8	65.0	31	30	90.5	, 0	76
14.0	1	;	40.0	11	8	65.5	31	31	91.0	78	77
	1	i	40.5	1.1		66.0	22	31		70	78
14.5	,	i	41.0	12	9 9		33	32	91.5 92.0	80	79 79
15.5	1		41.0	12		66.5	24		92.U	ου	
16.0	1	j	41.5		10	67.0	34	33	92.5	00	80
16.5	_	!	42.0	12	10	67.5		34	93.0	82	81
17.0	1	1	42.5		10	68.0	36	35	93.5		82
17.5		1	43.0	13	11	68.5		35	94.0	83	83
18.0	1	1	43.5		11	69.0	38	36	94.5		84
18.5		1	44.0	13	11	69.5		37	95.0	85	85
19.0	1	1	44.5		12	70.0	40	38	95.5		86
19.5		1	45.0	14	12	70.5		38	96.0	86	87
20.0	1	1	45.5		12	71.0	42	39	96.5		88
20.5		1	46.0	14	13	71.5		40	97.0	86	89
21.0	1	1	46.5		13	72.0	44	41	97.5		90
21.5	•	i	47.0	15	13	72.5		42	98.0	88	91
22.0	1	i	47.5	1.5	14	73.0	46	42	98.5	00	92
22.5	i	i	48.0	15	14	73.5	70	43	99.0	90	93
23.0	2	i	48.5	13	14	74.0	48	44	99.5	30	94
	۷		49.0	16	15	74.5	70	45	100.0	91	94
23.5	2	1		10			49	45 46	100.5	31	
24.0	3	2	49.5	16	15	75.0	47	-		6.3	95 96
24.5	2	2	50.0	16	16	75.5	50	46	101.0	93	
25.0	3	2	50.5	, -	16	76.0	50	47	101.0	0.5	97
25.5	_	2	51.0	17	16	76.5		47	102.0	95	98
26.0	4	2	51.5		16	77.0	52	49	102.5		99

TOTAL BOOKER, ISSISSION THINTIES BYTHEST WELLBOOK SHOPPIN COSTONE

Table I-2. AFQT 8A Cumulative Proportion for Half-Point Raw Score Values in 1980 Youth Population After Adjustment for Numerical Operations Subtest

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		Table I-	2. AFQT 8A			
				e Values in i Operations S		th
Cumulative Proportion	Raw Score	Cumulative Proportion	Raw Score	Cumulative Proportion ^a	Raw Score	Cumulative Proportion
.000054	30.0	.035757	56.0	.207313	82.0	.581737
			56.5 57.0			.592756 .604044
.000214	31.5	.041906	57.5	.222207	83.5	.615468
.000260						.626892 .638109
.000347	33.0	.046201	59.0	.237226	84.5 85.0	.648912
.000387	33.5	.050692	59.5	.242235	85.5	.659423
.000423	34.0	.052937	60.0	.247245	86.0	.669761
						.680013 .690265
.000604	35.5	.059879	61.5	.262263	87.5	.700517
.000722	36.0	.062264	62.0	.267210	88.0	.710769
						.721125 .731772
.001126	37.5	.069715	63.5	.282383	89.5	.742687
.001261	38.0	.072383	64.0	.288977	90.0	.753682
.001396	38.5	.075052	64.5 65.0	.296172		.764360 .774403
						.774403 .784127
.001832	40.0	.084748	66.0	.317522	92.0	.793852
.002057	40.5	.088251	66.5	.324656	92.5	.803561
						.813226 .822784
.002717	42.0	.098573	68.0	.346687	94.0	.832201
.003051	42.5	.101875	68.5	.353969	94.5	.841555
.003576	43.0	.105140				.850909 860262
			30.0	075000	26.0	.860262 .869616
.005655	44.5	.115136	70.5	.38 3118	96.5	.878970
.006484	45.0	.118600	71.0	.391400	97.0	.888324
		.122065 125504				.89767 <i>7</i> .907031
.009018	46.5	.129253	72.0 72.5	.416674	98.5	.916385
.009862	47.0	.132977	73.0	.424993	99.0	.925738
						.935082 .944406
.012387		.144149	74.0	.447105	100.5	.953368
.013328	49.0	.147873	75.0	.456734	101.0	.961382
.014482						.968552
						.975474 .981828
.018638	51.0	.161971	77.0	.485580	103.0	.986824
.020132	51.5	.165446	77.5	.493392	103.5	.990634
						.993873 .996936
						1.000000
.026626	53.5	.182906	79.5	.529605		
.028261	54.0	.187631	80.0	.539579		
ative proport	ion after	smoothing r	aw frequency	with S3RSSH.		
			106			
			200			
	.000054 .000108 .000108 .000162 .000214 .000260 .000303 .000347 .000387 .000423 .000465 .000523 .000604 .000722 .000856 .000991 .001126 .001261 .001396 .001531 .001666 .001832 .002057 .002299 .002507 .002717 .003051 .003576 .004208 .004208 .004891 .005655 .006484 .007328 .00408 .004891 .005655 .006488 .004891 .005655 .006488 .004891 .005655 .006488 .0015790 .011548 .012387 .013328 .014482 .015790 .017191 .018638 .020132 .021720 .023356 .024991 .026626 .028964 .031802 .033743	.000054 30.0 .000108 30.5 .000162 31.0 .000214 31.5 .000260 32.0 .000303 32.5 .000347 33.0 .000387 33.5 .000423 34.0 .000465 34.5 .000523 35.0 .000604 35.5 .000722 36.0 .000856 36.5 .000991 37.0 .001126 37.5 .001261 38.0 .001396 38.5 .001531 39.0 .001666 39.5 .001832 40.0 .002057 40.5 .002299 41.0 .002057 40.5 .002299 41.0 .002507 41.5 .002299 41.0 .003051 42.5 .003576 43.0 .004208 43.5 .004891 44.0 .005655 44.5 .006484 45.0 .007328 45.5 .006484 45.0 .007328 45.5 .008173 46.0 .007328 45.5 .008173 46.0 .007328 45.5 .008173 46.0 .007328 45.5 .008173 46.0 .007328 45.5 .008173 46.0 .007328 45.5 .008173 46.0 .007328 45.5 .001548 48.0 .012387 48.5 .013328 49.0 .014482 49.5 .015790 50.0 .017191 50.5 .018638 51.0 .020132 51.5 .021720 52.0 .023356 52.5 .024991 53.0 .026626 53.5 .028261 54.0 .029964 54.5 .031802 55.0 .033743 55.5 ative proportion after	.000054 30.0 .035757 .000108 30.5 .037807 .000162 31.0 .039856 .000214 31.5 .041906 .000260 32.0 .046201 .000347 33.0 .048447 .000387 33.5 .050692 .000423 34.0 .052937 .000465 34.5 .055199 .000523 35.0 .057512 .000604 35.5 .059879 .000722 36.0 .062264 .000856 36.5 .064652 .000991 37.0 .067114 .001126 37.5 .069715 .001261 38.0 .072383 .001396 38.5 .075052 .001531 39.0 .077932 .001666 39.5 .081234 .001832 40.0 .084748 .002057 40.5 .088251 .002299 41.0 .091730 .002507 41.5 .095184 .002717 42.0 .098573 .003051 42.5 .101875 .003576 43.0 .105140 .004208 43.5 .108406 .004891 44.0 .111722 .005655 44.5 .115136 .004408 43.5 .108406 .004891 44.0 .111722 .005655 44.5 .115136 .004408 43.5 .108406 .007328 45.5 .122065 .008173 46.0 .125594 .009018 46.5 .129253 .0090862 47.0 .132977 .010706 47.5 .136701 .011548 48.0 .140425 .003376 49.9 .147873 .014482 49.5 .151542 .015790 50.0 .155083 .017191 50.5 .158529 .018638 51.0 .161971 .020132 51.5 .165446 .021720 52.0 .169228 .023356 52.5 .173593 .024991 53.0 .178250 .026626 53.5 .182906 .028261 54.0 .187631 .029964 54.5 .192493 .031802 55.0 .197424 .033743 55.5 .202361 ative proportion after smoothing r	.000054 30.0 .035757 56.0 .000108 30.5 .037807 56.5 .000108 30.5 .037807 56.5 .000108 30.5 .037807 56.5 .000108 31.0 .039856 57.0 .000214 31.5 .041906 57.5 .000260 32.0 .044005 58.0 .000303 32.5 .046201 58.5 .000347 33.0 .048447 59.0 .000387 33.5 .050692 59.5 .000423 34.0 .052937 60.0 .000465 34.5 .055199 60.5 .000523 35.0 .057512 61.0 .000604 35.5 .059879 61.5 .000722 36.0 .062264 62.0 .000856 36.5 .064652 62.5 .000991 37.0 .067114 63.0 .001126 37.5 .069715 63.5 .00102161 38.0 .072383 64.0 .001396 38.5 .075052 64.5 .001531 39.0 .077932 65.0 .001531 39.0 .077932 65.0 .001666 39.5 .081234 65.5 .001832 40.0 .084748 66.0 .002057 40.5 .088251 66.5 .00217 42.0 .098573 68.0 .002507 41.5 .095184 67.5 .002507 41.5 .095184 67.5 .002507 41.5 .095184 67.5 .003576 43.0 .105140 69.0 .003051 42.5 .101875 68.5 .004891 44.0 .111722 70.0 .005655 44.5 .101875 68.5 .004891 44.0 .111722 70.0 .003051 42.5 .101875 68.5 .004891 44.0 .111722 70.0 .005655 44.5 .115136 70.5 .008173 46.0 .125594 72.0 .00878 48.5 .122065 71.5 .008173 46.0 .125594 72.0 .001548 48.0 .140425 74.0 .001382 49.0 .147873 75.0 .001548 48.0 .140425 74.0 .001388 49.0 .147873 75.0 .001549 49.5 .15542 75.5 .0015790 50.0 .155083 76.0 .017191 50.5 .158529 76.5 .01548 48.0 .140425 74.0 .012387 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .144149 74.5 .013287 48.5 .15542 75.5 .008626 79.5 .028261 54.0 .18638 51.0 .161971 77.0 .026626 53.5 .182906 79.5 .028261 54.0 .187631 80.0 .029964 54.5 .192493 80.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .202361 81.5 .0233743 55.5 .023361 81.5 .0233743	.000054 30.0 .035757 56.0 .207313 .000108 30.5 .037807 56.5 .212271 .000108 30.5 .037807 56.5 .212271 .000214 31.5 .041906 57.5 .222207 .000260 32.0 .044005 58.0 .227206 .000303 32.5 .046201 58.5 .232216 .000347 33.0 .048447 59.0 .237226 .000347 33.0 .048447 59.0 .237226 .000347 33.0 .05692 59.5 .242235 .000423 34.0 .052937 60.0 .247245 .00065 34.5 .055199 60.5 .252255 .000523 35.0 .057512 61.0 .257265 .000523 35.0 .057512 61.0 .257265 .000653 35.5 .059879 61.5 .262263 .000722 36.0 .062264 62.0 .267210 .000856 36.5 .064652 62.5 .272093 .000991 37.0 .067114 63.0 .276948 .001126 37.5 .069715 63.5 .282383 .001261 38.0 .072383 64.0 .288977 .001396 38.5 .075052 64.5 .296172 .001531 39.0 .077932 65.0 .303360 .001666 39.5 .081234 65.5 .310467 .001832 40.0 .084748 66.0 .317522 .00299 41.0 .091730 67.0 .331947 .002507 40.5 .088251 66.5 .324656 .002299 41.0 .091730 67.0 .331947 .002507 41.5 .095184 67.5 .339317 .002507 41.5 .095184 67.5 .339317 .002507 41.5 .098573 68.0 .346687 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .00351 42.5 .101875 68.5 .353969 .004891 44.0 .111722 70.0 .375329 .004891 44.0 .111722 70.0 .375329 .005655 44.5 .115136 70.5 .383118 .006484 45.0 .118600 71.0 .391400 .007328 45.5 .122065 71.5 .399825 .008173 46.0 .125594 72.0 .408249 .00918 46.5 .125594 72.5 .40891 .009328 49.0 .147893 75.0 .44893 .01548 48.0 .140425 74.0 .408249 .00918 46.5 .129253 72.5 .416674 .009325 74.5 .13660 77.0 .331947 .002717 42.0 .098573 75.5 .408991 .009328 49.0 .147893 75.0 .408249 .009328 45.5 .122065 71.5 .399825 .003328 49.0 .147893 75.0 .408249 .009328 45.5 .129265 71.5 .399825 .0032356 52.5 .173593 78.5 .510820 .00932356 52.5 .173593 78.5 .510820 .0293256 52.5 .173593 78.5 .510820 .029366 52.5 .173593 78.5 .510820 .029366 52.5 .173593 78.5 .510820 .029366 52.5 .173593	.000054 30.0 .035757 56.0 .207313 82.0 .000108 30.5 .037807 56.5 .212271 82.5

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